Education and Training in Developmental Disabilities, 2008, 43(4), 474–485

High Tech Cooking: A Literature Review of Evolving Technologies for Teaching a Functional Skill

Linda C. Mechling
University of North Carolina Wilmington

Abstract: This review synthesizes the empirical literature (1986-2006) focusing on teaching cooking skills to persons with moderate to severe intellectual disabilities. Twenty-two studies were identified which provided information on four forms of technologies currently being used to teach food preparation: (a) picture-based systems; (b) Palmtop personal (hand-held) computer-based systems; (c) auditory systems; and (d) video-based systems. Implications for instruction and future research are discussed based on the results of review.

Over the past two decades food preparation has been frequently studied and identified as an essential skill for living independently across a range of settings (Graves, Collins, Schuster, & Kleinert, 2005; Horsfall & Maggs, 1986; Martin, Rusch, James, Decker, & Trtol, 1982; Schuster, 1988). In addition to providing nutrition, preparing meals has added value including social opportunities (i.e. cooking with friends), recreation (i.e. watching cable cooking shows; joining cooking classes), choice making, and employment opportunities in the food industry (Schuster). Compared to eating out, ordering in, or hiring someone else to cook, preparation of meals at home may be more economically feasible for persons with disabilities (Schuster). Cost efficiency of pre-prepared meals may also be a concern for some persons living on a fixed or supported income. For example, although it may require fewer steps for preparation, the cost of microwavable macaroni and cheese per ounce (compared to box preparation) may be an important factor when selecting meals to purchase, prepare, and teach.

A number of studies have been conducted to evaluate the effectiveness of teacher delivered prompts and procedures for teaching cooking skills to persons with disabilities. The strategies have included: constant time delay (Bozkurt & Gursel, 2005; Schuster, Gast, Wolery, & Guiltinan, 1988); teaching in dyads (Hall, Schuster, Wolery, Gast, & Doyle, 1992; Wolery, Ault, Gast, Doyle, & Griffen, 1991); teaching chained tasks in specific order versus functional order (Wright & Schuster, 1988); teaching in a total task versus backward chaining format (Kayser, Billingsley, & Neel, 1986); system of least prompts (Demchak, 1992; Horsfall & Maggs, 1986; Jones & Collins, 1997; Schleien, Ash, Kiernan, & Wehman, 1981; Steege, Wacker, & McMahon, 1987); and graduated guidance (Demchak, 1992). These studies found each of the procedures to be effective in the acquisition of food preparation skills when instructors used a set of prescribed prompting and instructional procedures. Concern exists, however, for the transfer of stimulus control from adult lead instruction to natural sets of prompts that can be independently used over an extended period of time and across a range of stimuli while cooking. Decreasing the need for continuous supervision and prompting by others continues to be an educational focus when designing instructional programs for persons with disabilities.

Persons without disabilities use permanent prompts such as written notes and text based messages to direct their own behavior. Cook books and recipe cards, for example, provide permanent prompts to adults for meal preparation. These prompts prohibit the need to memorize step sequences and allow preparation of simple to complex meals. These

Correspondence concerning this article should be addressed to Linda C. Mechling, University of North Carolina Wilmington, 601 S. College Road, Wilmington, NC 28403-5940.

prompts are permanent resources in many kitchens and it is recognized that it would not be functional to take away these examples of visual prompts for food preparation. When a person has an intellectual disability it may be more critical that prompts are permanently available to them so that multiple and varying recipes are available regardless of their length and complexity.

Encouraging research on cooking instruction for persons with disabilities has shifted the control away from the instructor to stimulus materials and equipment that can serve to teach or prompt completion of tasks. These materials have traditionally been in the form of picture based systems, but the use of auditory prompting became the focus of research in the 1990s as well as the emergence of video-based procedures. The purpose of this review was to examine the published, empirical literature evaluating technology to assist persons with disabilities to complete cooking tasks. The focus of this review is technology applications for teaching food preparation skills to persons with moderate to severe intellectual disabilities, including those with a diagnosis of autism spectrum disorder. The review included studies that used both light tech (picture prompts and audio recording devices), mid tech (VCR, DVD players) and high tech devices (Palmtop PC, computer-based systems). Studies reviewed included those using technology to teach new cooking skills or those which used technology as an independent self-prompting device (used alone by the person) for completing a cooking skill.

Method

Studies conducted over the past 20 years (1986-2006) were reviewed. Those identified and included in the review met the following criteria:

1. Empirical study
2. Publication in peer-reviewed journal
3. Evaluation of food preparation skills
4. Participants were diagnosed with a moderate to severe intellectual disability
5. Article published in English

Studies were located by conducting an electronic search of ERIC using the key search words: cooking, food, food preparation, nutrition, meal preparation, snack, drink, recipe, microwave, stovetop, oven, and kitchen skills. A manual search was completed by examining the table of contents for the following relevant journals: *American Journal of Mental Retardation, Exceptionality, Education and Training in Developmental Disabilities, Exceptional Children, Focus on Autism and Other Developmental Disabilities, Focus on Exceptional Children, Journal of Applied Behavior Analysis, Journal of the Association for Persons with Severe Disabilities, Journal of Autism and Developmental Disabilities, Journal of Developmental and Physical Disabilities, Journal of Special Education, Journal of Special Education Technology, Mental Retardation,* and *Remedial and Special Education.* Lastly, an ancestral search was made of all reference lists of identified articles.

Studies emerged which focused on technology for: a) teaching new food preparation skills; and b) controlling antecedents for self-prompting food preparation.

Results

Twenty-two studies and two reviews were identified. An earlier review, conducted by Schuster (1988), reported the results of six studies focusing on cooking instruction with persons with intellectual disabilities while Marchand-Martella, Smith, and Agran (1992) focused their review on both food preparation and meal planning for persons with disabilities. The technology identified in the current review included: (a) picture prompts (7 studies); (b) Palmtop personal (hand held) computer-based systems (3 studies); (c) audio cassette players (5 studies); and (d) video-based systems (7 studies). Table 1 provides further information concerning the design of each study, participants, cooking skills taught, and results.

The review found a range of technology that was effective for teaching both new cooking tasks and self-operation of devices to guide completion of cooking tasks independent of instructor prompts. The first part of the paper reviews each of the identified studies and structures the review around types of technology. The final part of the paper addresses implications for current practice and suggestions for future research.

TABLE 1

Overview of Technology Based Cooking Instruction for Persons with Disabilities

Reference	*Participants*	*Cooking Task (Dependent Variable)*	*Procedure*	*Design*	*Results*
Picture Based Systems					
Agran, Fodor-Davis, Moore & Martella (1992)	*n* = 3 CA = 14–16yrs Moderate, Severe ID	Sack lunch	Single photos turned over	Multiple baseline across participants	2 of 3 students made sack lunches in correct sequece. Genera lization across novel customers.
Griffen, Wolery, & Schuster (1992)	*n* = 3 CA = 10–13yrs Moderate ID	Milk shake, scrambled eggs, pudding	Black & white line drawings, test, in book	Multiple probe across students & tasks	Each student learned each task. Maintenance 1 wk later.
Pierce & Schreibman (1994)	*n* = 3 CA = 6–9yrs Autism	Making lunch	Color photos in book	Multiple probe across behaviors, replicated across children	Independent task completion. Generalization across settings & tasks. Maintenance of performance.
Fiscus, Schuster, Morse, & Collins (2002)	*n* = 4 CA = 8–12yrs Moderate, Severe ID	Cheese & crackers, waffles & syrup, chocolate milk	Picture recipe book	Multiple probe across behaviors, replicated across students	Effective with 3 of 4 students Generalization across materials. Maintenance until "end of school year.
Schuster & Griffen (1991)	*n* = 5 CA = 9–12yrs Moderate ID	Kool-Aid	Colored line drawing & text 2 sided index card	Multiple probe across students	Effective for all students. 12 months maintenance.
Schuster & Griffen (1993)	*n* = 4 CA = 9–12yrs Moderate ID	Orange juice	Black & white line drawing in book	Multiple probe across students	Effective for all students. Generalization across settings and materials. Maintenance 60 days.
Singh, Oswald, Ellis, & Singh (1995)	*n* = 3 CA = adults Profound ID	Pineapple mousse	Black & white line drawings in book	Multiple baseline across subjects	Acquisition and maintenance of multi-step meal preparation.
Palmtop Personal Computers					
Lancioni, O'Reilly, Seedhouse, Furniss, & Cunha (2000)	*n* = 6 CA = 23–47yrs Severe Developmental Disability	Pudding, soup, cookies, fruit dessert	Palmtop PC	Alternating treatment	Palmtop PC with vibration, auditory prompts, & picture cues was more effective than picture cards.
	n = 3 Selected based on 90% maintenance performance from Study 1	Tasks from study 1		Alternating treatment	Clustering of picture instructions on Palmtop PC effective for maintaining task performance.

TABLE 1—(*Continued*)

Reference	*Participants*	*Cooking Task (Dependent Variable)*	*Procedure*	*Design*	*Results*
Lancioni, O'Reilly, Van den Hof, Furniss, Seedhouse, & Rocha (1999)	*n* = 4 CA = 19–39yrs Severe ID	Soup, cookies, 2 desserts	Palmtop PC	Alternating treatment	Palmtop PC with auditory prompts & step-by-step picture instruct ions effective for task completion. Presenting instruction in clusters maintained high levels of performance.
Lancioni, Van den Hof, Boelens, Rocha, & Seedhouse (1998)	*n* = 3 CA = 20–36 Severe ID	Soup, cookies, fruit dessert	Palmtop PC	Alternating treatment with reversal	Palmtop PC with auditory prompts, vibration, & pictures resulted in significantly higher levels of correct performance than pictures.
Auditory Systems					
Alberto, Sharpton, Briggs, & Stright (1986)	*n* = 4 CA = 12–16yrs Moderate, Severe ID	Cup of soup, peanut butter & jelly sandwich	Audio cassette player	Multiple baseline across tasks	Four students learned all tasks. Maintenance of skill after audio removed.
Lancioni, Klaase, & Goossens (1995)	*n* = 2 CA = 13yrs Mild ID Multiple Disabilities	Omelet, pudding, mushroom sauce, pizza bread, fruit drinks	Audio cassette player	Alternating treatments	Auditory and pictorial prompting sy stems equally effective.
Lancioni, O'Reilly, & Oliva (2001)	*n* = 3 CA = 19–22 Mild ID Visual	Stuffed cake, pudding, dessert cake, appetizer, cheese salad	Audio cassette player	Alternating treatments	Single step instructions effective in increasing task performance. Clusters of verbal instructions maintained high level of performance. Decrease in performance when audio removed.
Steed & Lutzker (1999)	*n* = 2 CA = 37, 48yrs Mild ID, Schizophrenia	Coffee	Audio cassette player	Multiple baseline across behaviors, replicated across 2 adults	Increases in independent task completion. Generalization to untrained settings. Maintenance of performance after 6 months
Trask-Tyler, Grossi, & Heward (1994)	*n* = 3 CA = 17–21yrs Developmental Disability, Visual Impairment	Microwave pizza, French fries, popcorn; cake, brownies; cheese-cake, tea, coffee, pudding	Audio cassette player	Multiple baseline across behaviors	Students completed steps using tape recorded recipes. Generalization to similar and more complex recipes.
Video-Based Systems					
Bidwell & Rehfeldt (2004)	*n* = 3 CA = 33–72yrs Severe, Profound ID	Coffee	Video modeling	Multiple baseline across participants	Mastery of tasks. Generalization across settings, stimuli, & people. Maintenance 1 month later for 2 of 3 students.

TABLE 1—(*Continued*)

Reference	*Participants*	*Cooking Task (Dependent Variable)*	*Procedure*	*Design*	*Results*
Graves, Collins, Schuster, Kleinert (2005)	*n* = 3 CA = 16–20yrs Moderate ID	Macaroni & cheese, Ramen noodles, peanut butter & jelly sandwich	Video prompting. Subjective point of view	Multiple probe across behaviors & replicated across participants	Effective for each student. Maintenance of skills after 2 weeks.
Lasater & Brady (1995)	*n* = 2 CA = 14–15yrs Developmental Disability, Behavior Disorder	School lunch, peanut butter & jelly sandwich	Video self-modeling	Multiple baseline across tasks	Increased task fluency. Generalization across tasks. Maintenance after removing video.
Rehfeldt, Dahman, Young, Cherry, & Davis (2003)	*n* = 3 CA = 22–37yrs Moderate, Severe ID	Peanut butter & jelly sandwich	Video modeling	Multiple probe across participants	Mastery of tasks. Generalization across settings. Maintenance after 1 month.
Shipley-Benamou, Lutzker, & Taubman (2002)	*n* = 3 CA = 5 yrs Autism	Orange juice	Video modeling Subjective point of view	Multiple probe across tasks & replicated across participants	Effective in acquisition of skills. Maintenance of results after 1 month.
Sigafoos et al. (2005)	*n* = 3 CA = 34–36yrs Moderate ID	Microwave popcorn	Video prompting	Multiple probe across participants	Acquisition for 2 of 3 students. Maintenance after video prompting removed 2, 6, 10 wks.
Van Laarhoven & Van Laarhoven-Myers (2006)	*n* = 3 CA = 17–19yrs Moderate ID	Microwave pizza	Video modeling, video modeling + photos, video modeling + in vivo video prompting	Within subjects alternating treatments design	All procedures effective. Video + photos & video + in vivo prompting more efficient than video modeling alone.

Picture Based Systems

To accommodate for a lack of text reading skills, picture prompts, in the form of recipe cards, were researched as early as 1977 (Robinson-Wilson). Early picture-based systems relied on hand drawn illustrations and were frequently paired with written instructions (Browder, Hines, McCarthy, & Fees, 1984; Johnson & Cuvo, 1981). Preparation of picture systems then evolved to film based development of black and white photographs, color photographs, Xerox copies of photographs, and scanned images onto computer based systems. Currently, digital photography and downloaded images from internet sources are also available for developing picture-based systems.

The current review identified seven studies employing the use of picture based systems to teach food preparation skills. The format of the system and number of pictures per page varied among the studies. Agran, Fodor-Davis, Moore, and Martella (1992) presented single photographs of items to be placed into sack lunches for customers. Photographs were turned over as items were placed into the bag. Other researchers used single pictures per page to represent one step of a task analysis and assembled the pages into book form using metal ring binders (Griffen,Wolery, & Schuster, 1992; Pierce & Schreibman, 1994; Schuster & Griffen, 1993). Others have presented recipes (task analysis) in book form with more than one picture per page (Fiscus, Schuster, Morse, & Collins, 2002; Singh, Oswald, Ellis, & Singh, 1995; Schuster & Griffen, 1991).

Commercially made cookbooks for persons unable to read have also become available to practitioners and present individual steps or small clusters of steps on single pages (*Stepwise Lunch Cookbook*: Jackson, 1998) and multiple pictures per page (*Look'n Cook Microwave: Easy-to-Make Illustrated Recipes:* Hanson, 1999; *Visual Recipes: A Cookbook for Non-Readers:* Orth, 2000). It is unclear from the literature reviewed whether a single picture per page or multiple pictures per page are more effective for certain learners. Multiple pictures decrease the need to turn pages and possibly losing one's place, while other students may find it difficult to follow multiple pictures on a page and may lose their place if temporarily distracted.

Palmtop Personal Computers

As one of the most newly emerging forms for prompting task completion, palmtop personal computers also represent one of the "highest tech" forms of technology being used as antecedent prompts for persons with intellectual disabilities. They are presented next in the current review because to date they are primarily a picture based system. Using features of a "touch screen", persons access digital photographs by touching a dynamic display on a hand-held system. The system can be programmed to move to the next step (next photograph) by pressing a "Done" or "Next" button on the touch screen. One advantage that these systems may have over traditional static picture systems is the incorporation of audio. By touching a photograph, "Play", or "Start" button, a description of how to complete the step is heard. A student can repeat the auditory and visual step as often as needed.

Recent evaluations have been importing digital photographs onto Palmtop personal computers to provide antecedent prompts for food preparation to persons with intellectual disabilities (Lancioni et al., 1999; Lancioni, O'Reilly, Seedhouse, Furniss, & Cunha, 2000; Lancioni, Van den Hof, Boelens, Rocha, & Seedhouse, 1998). In two interesting comparison studies, Lancioni and others (1998; 1999) found that the Palmtop PC programs with auditory prompts and step-by-step instructions were more effective than traditional picture cards when measuring the percentage of steps performed correctly on tasks. They attribute the difference to students losing their place and mishandling the manual pictures. The portable systems also included auditory and vibrating prompts to cue students to initiate steps of a task analysis, features unavailable with manual picture systems. Also of interest was the comparison made between single pictures for each task step and multiple steps clustered into a picture in the Lancioni et al. (1999) study. Results indicated that students were able to maintain high levels of task performance when steps were clustered together into one picture.

Commercially available hand-held products

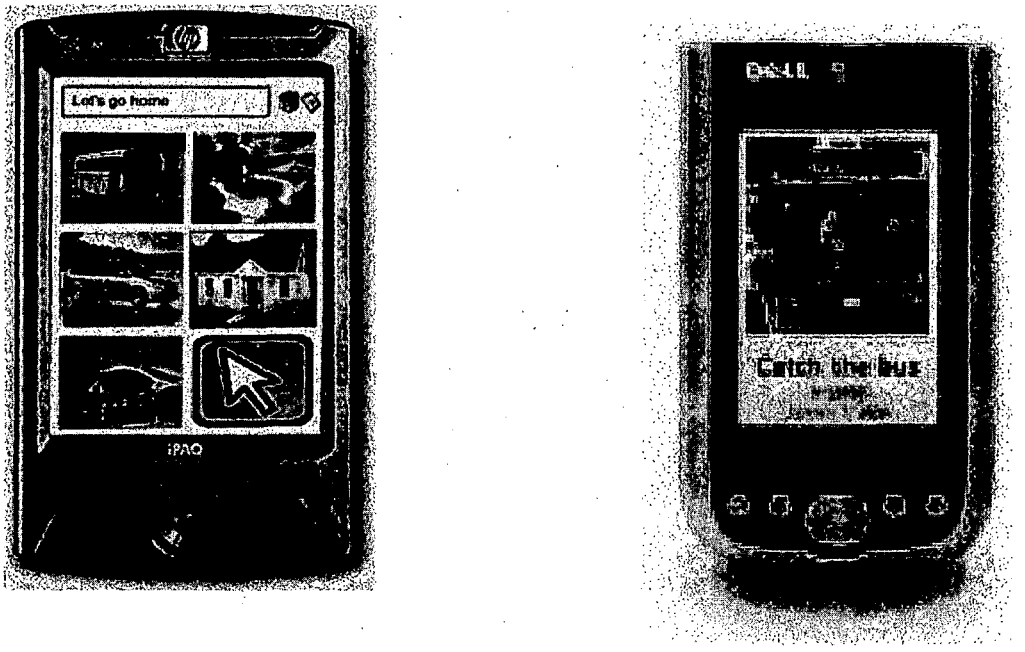

Figure 1. Hand-held prompting devices: *Cyrano Communicator* and *Independent Living Suite.*

(*Cyrano Communicator,* One Write Company; *Independent Living Suite,* AbleLink Technologies) (Figure 1) are appearing on the market and are being distributed among companies that sell products specifically designed for individuals with disabilities (i.e. Mayer-Johnson LLC). Cost is one argued disadvantage of these systems, although it is predicted that similar to other evolving technologies, costs will continue to decrease (Davies, Stock, & Wehmeyer, 2002; Swan, Swan, Van Hover, & Bell, 2002). Another disadvantage for the hand-held system is that although the systems are manufactured with some features already built into them, they do require some computer skills and initial set-up time to customize settings, photographs, and tasks.

Auditory Systems

Traditionally, auditory systems used portable cassette players with recorded step-by-step prompts for completing a task. As described in the previous review section, use of hand-held electronic devices such as Palmtop PCs, are beginning to replace the traditional use of auditory cassette players for delivering auditory cues to persons with disabilities. These systems now have the advantage of presenting both visual and auditory information simultaneously. None the less, five studies were identified which effectively taught students with disabilities to complete multi-step cooking tasks using auditory prompts (Alberto, Sharpton, Briggs, & Stright, 1986; Lancioni, Klaase, & Gooseens, 1995; Lancioni, O'Reilly, & Oliva, 2001; Trask-Tyler, Grossi, & Heward, 1994; Steed & Lutzker, 1999). In addition, one of the studies compared the effects of pictures alone to auditory prompting and found no significant differences between the two prompting procedures (Lancioni et al. 1995). A second study compared single word instructions (one word corresponding to each step of a task analysis) to clustering of instructions (two or more steps heard by the student when "Play" was selected on the cassette player). Results supported students' abilities to follow multiple word prompts to complete food preparation tasks.

While the audio system used by Lancioni et al. (1995) allowed the cassette recorder to stop automatically after each prompt, and repetition of prompts, most systems rely on the

following sequence of steps : a) a "beep" to signal the end of a step; pushing a "Stop" button; completion of the step; and pushing a "Start" button to hear the next step; or b) recording of a pause between instructions to allow for completion of the step before the next direction was provided. These requirements may make auditory systems difficult for persons with intellectual disabilities to operate and to repeat steps when errors are made. A distinct advantage of new technologies such as hand-held computer-based systems are provision for repetition of steps (touch a photograph) while including digital images for persons who are not strong auditory learners.

Video Based Systems

The majority of the work investigating video instruction for persons with disabilities began in the mid to late 1990s (Mechling, 2005). Understandably, with the increased availability of VCRs, classroom teachers and researchers began to implement the use of video to teach a range of skills. With the exception of one identified study (Lasater & Brady, 1995) all of the studies in the current review on teaching cooking skills were completed in the 21st century.

Use of video to instruct can be presented through four primary modes (Mechling, 2005):

1. Video Modeling. Student watches a complete video segment of a skill performed by someone else (i.e. peer or adult) and later performs the task.
2. Video Self-Modeling. Student watches him/herself in an edited video in which it appears that he/she is proficient at the task to be learned. Video is created by editing out errors or by taping segments so that adult prompting cannot be seen in the final version.
3. Video Prompting. Student watches a step of a task and then completes that step before continuing on with the next video segment.
4. Subjective Point of View. Video modeling or video prompting is presented from the student's perspective as if the student were completing the task (i.e. walking through a store) (Norman, Collins, & Schuster, 2001).

The current review found that the majority of the studies teaching cooking skills used video modeling (Bidwell, & Rehfeldt, 2004; Rehfeldt, Dahman, Young, Cherry, & Davis, 2003; Shipley-Benamour, Lutzker, & Taubman, 2002; Van Laarhoven & Van Laarhoven-Myers, 2006), while self-modeling was used in the earlier study by Lasater and Brady (1995) and video prompting was used to teach microwave use (Sigafoos et al., 2005). Additionally, Graves et al. (2005) used video prompting by presenting cooking tasks using subjective point of view and Shipley et al. conducted one of the first studies evaluating subjective point of view to teach functional skills (including preparation of orange juice).

As expected, earlier studies frequently used a VCR to present video instruction to learners, however, evolving technology is bringing an increase in the use of laptop computers and portable DVD players to present video instruction. Advantages to these mediums of instruction are portability and ease of use. Similar to the advantages of hand-held computer-based systems over audio cassettes, a portable DVD player or laptop computer allow the learner to replay and skip video segments to precise locations, whereas a VCR is often controlled by the instructor (Graves et al., 2005). Four of the seven studies teaching cooking skills with video used laptop or portable computer-based systems (Bidwell & Rehfeldt, 2004; Rehfeldt et al., 2003; Sigafoos et al., 2005; Van Laarhoven & Van Laarhoven-Myers, 2006).

All of the reviewed studies show promise for presenting information to students through video technology. Results support researchers who have found that video can present information in "real life" scenarios (Alcantara, 1994), provide multiple teaching examples (Charlop-Christy, Le, & Freeman, 2000), and can add the features of motion and sound that allow learners to experience actual actions in process (Stephens & Ludy, 1975).

Although the merits of video seem apparent, the advantage of video instruction over static picture presentation is unclear and will continue to require future investigation.

While video-based systems may include more information and cues than can be obtained from static pictures, future research should include comparison between these two modes of presentation.

Researchers are also investigating the combined strength of using both video and pictures. For example, Van Laarhoven and Van Laarhoven-Myers (2006) found that video modeling with pictures and video modeling with in vivo video prompting were more efficient (although all were equally effective) than video modeling presented alone to teach students to complete daily living skills (including cooking microwave pizza).

Another area of interest is whether one form of video instruction (i.e. video prompting versus video modeling) holds particular advantage for some learners. Although not conducted with a cooking related task, Cannella-Malone et al. (2006) found video prompting to be effective in teaching multistep daily living tasks to adults with intellectual disabilities while video modeling was "generally shown to be ineffective." These results appear to have implications for persons developing video-based prompting systems for food preparation. The researchers state that the differences may have been due to use of brief video clips (video prompting) versus the attentional and retentional requirements of watching an entire task. In this current review of the literature, cooking tasks taught using video modeling were: orange juice (Shipley-Benamou et al., 2002); microwave pizza (Van Laarhoven & Van Laarhoven-Myers, 2006); peanut butter and jelly sandwich (Rehfeldt et al., 2003; Lasater & Brady, 1995); school lunch (Lasater & Brady); and coffee (Bidwell & Rehfeldt, 2004). Although these tasks had multiple steps, complete recipes and meal preparation with more than one item, tend to be more complex. It appears that recipes presented in a step-by-step format through video prompting may hold particular value for teaching cooking tasks that individuals will face in their daily lives. An additional avenue of research will be the application of step-by-step video prompting on portable hand held devices as the capability of presenting video on these devices increases.

Discussion

Attention to increasing independence and opportunities for persons with disabilities through teaching functional skills such as cooking will likely continue to evolve just as it has for the last 20 years covered in this review. As technology advances, so will the demands for response in special education to stay abreast of how these advances can be applied to improving the lives of persons with disabilities. Increasingly, novice technology users will likely become familiar with the process of making their own personal CDs, DVDs, and computer-based programs. Joined with this increase will be opportunities to develop customized programs to meet the individual needs and styles of learners. For example, personalized DVDs or CDs could be made for preparing a recipe, step-by-step, with video footage taken in the learner's personal kitchen. Persons following the DVD or CD can watch a step, pause the player, complete the step, and so forth while watching the task being completed with the exact appliances and utensils that they will be using and while viewing exactly where items are stored within their own kitchen.

Research supports the efficient presentation of information to learners with disabilities. While handheld devices and portable prompting systems with video capabilities provide promise for delivering information in a format that can be operated independently by students to direct their own behavior, the importance of "traditional" light tech applications and combination of systems should not be overlooked. Findings from this review suggest some implications for future research to enhance instruction in the area of food preparation:

1. More studies comparing video prompting and video modeling to teach complex meal preparation.
2. Generalization measures of systems such of video prompting to untaught recipes (similar to cooking new recipes from a cookbook).
3. Comparison of video-based systems and static picture systems.
4. Comparison of picture-based systems using:
   a. single pictures per page versus multiple pictures per page
   b. single step per picture versus clustering of steps per picture
5. Studies combining static pictures and video-based systems.
6. More studies regarding hand-held systems

and portable DVD players that can be used in the kitchen to deliver picture based or video based instruction.

7. Social validation of the various procedures and student preference for use.

References

AbleLink Technologies. *Independent living suite.* Colorado Springs, CO

Agran, M., Fodor-Davis, J., Moore, S. C., & Martella, R. C. (1992). Effects of peer-delivered self-instructional training on a lunch-making work task for students with severe disabilities. *Education and Training in Mental Retardation, 27,* 230–240.

Alberto, P. A., Sharpton, W. R., Briggs, A., & Stright, M. H. (1986). Facilitating task acquisition throught he use of a self-operated auditory prompting system. *Journal of the Association for Persons with Severe Handicaps, 11,* 85–91.

Alcantara, P. R. (1994). Effects of videotape instructional package on the purchasing skills of children with autism. *Exceptional Children, 61,* 40–55.

Bidwell, M. A., & Rehfeldt, R. A. (2004). Using video modeling to teach a domestic skill with an embedded social skill to adults with severe mental retardation. *Behavioral Internventions, 19,* 263–274.

Bozkurt, F., & Gursel, O. (2005). Effectiveness of constant time delay on teaching snack and drink preparation skills to children with mental retardation. *Education and Training in Developmental Disabilities, 40,* 390–400.

Browder, D. M., Hines, C., McCarthy, L. J., & Fees, J. (1984). A treatment package for increasing sight word recognition for use in daily living skills. *Education and Training of the Mentally Retarded, 19,* 191–200.

Cannella-Malone, H., Sigafoos, J., O'Reilly, M., De La Cruz, B., Edrisinha, C., & Lancioni, G. E. (2006). Comparing video prompting to video modeling for teaching daily living skills to six adults with developmental disabilities. *Education and Training in Developmental Disabilities, 41,* 344–356.

Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders, 30,* 537–552.

Davies, D. K., Stock, S. E., & Wehmeyer, M. L. (2002). Enhancing independent time-management skills of individuals with mental retardation using a palmtop personal computer. *Mental Retardation, 40,* 358–365.

Demchak, M. (1992). A comparison of graduated guidance and increasing assistance in teaching adults with severe handicaps leisure skills. *Education and Training in Mental Retardation, 24,* 45–55.

Fiscus, R. S., Schuster, J. W., Morse, T. E., & Collins, B. C. (2002). Teaching elementary students with cognitive disabilities food preparation skills while embedding instructive feedback in the prompt and consequent event. *Education and Training in Mental Retardation and Developmental Disabilities, 37,* 55–69.

Graves, T. B., Collins, B. C., Schuster, J. W., & Kleinert, H. (2005). Using video prompting to teach cooking skills to secondary students with moderate disabilities. *Education and Training in Developmental Disabilities, 40,* 34–46.

Griffen, A. K., Wolery, M., & Schuster, J. W. (1992). Triadic instruction of chained food preparation responses: Acquisition and observational learning. *Journal of Applied Behavior Analysis, 25,* 193–204.

Hall, M. G., Schuster, J. W., Wolery, M., Gast, D. L., & Doyle, P. M. (1992). Teaching chained skills in a non-school setting using a divided half instructional format. *Journal of Behavioral Education, 2,* 257–279.

Hanson, D. (1999). *Look'n cook microwave: Easy-to-make illustrated recipes.* Verona, WI: Attainment Company.

Horsfall, D., & Maggs, A. (1986). Cooking skills instruction with severely multiply handicapped adolescents. *Australia and New Zealand Journal of Developmental Disabilities, 12,* 177–186.

Jackson, B. (1998). *Stepwise lunch cookbook.* Framingham, MA: Therapro, Inc.

Jones, G. Y., & Collins, B. C. (1997). Teaching microwave skills to adults with disabilities: Acquisition of nutrition and safety facts presented as nontargeted information. *Journal of Developmental and Physical Disabilities, 9,* 59–78.

Johnson, B. F., & Cuvo, A. J., (1981). Teaching mentally retarded adults to cook. *BehaviorModification, 5,* 187–202.

Kayser, J. E., Billingsley, F. F., & Neel, R. S. (1986). A comparison of in-context and traditional instructional approaches: Total task, single trial versus backward chaining, multiple trials. *Journal of the Association for Persons with Severe Handicaps, 11,* 28–38.

Lancioni, G. E., Klaase, M., & Goossens, A. (1995). Brief report: Pictorial vs. auditory prompt systems for promoting independent task performance in adolescents with multiple handicaps. *Behavioral Interventions, 10,* 237–244.

Lancioni, G. E., O'Reilly, M. F., & Oliva, D. (2001). Self-operated verbal instructions for people with intellectual and visual disabilities: Using instruction cluster after task acquisition. *International Journal of Disability, Development and Education, 48,* 304–312.

Lancioni, G. E., & O'Reilly, M. F., Seedhouse, P., Furniss, F., & Cunha. (2000). Promoting independent task performance by persons with severe developmental disabilities through a new computer-aided system. *Behavior Modification, 24,* 700–718.

Lancioni, G. E., O'Reilly, M. F., Van den Hof, E., Furniss, F., Seedhouse, P., & Rocha, N. (1999). Task instructions for persons with severe intellectual disability: Reducing the number of instruction occasions after the acquisition phase. *Behavioral Interventions, 14,* 199–211.

Lancioni, G. E., Van den Hof, E., Boelens, H., Rocha, N., & Seedhouse, P. (1998). A computer-based system providing pictorial instructions and prompts to promote task performance in persons with severe developmental disabilities. *Behavioral Interventions, 13,* 111–122.

Lasater, M. W., & Brady, M. P. (1995). Effects of video self-modeling and feedback on task fluency: A home-based intervention. *Education and Treatment of Children, 18,* 389–407.

Marchand-Martella, N. E., Smith, M. H., & Agran, M. (1992). Food preparation and meal planning for persons with disabilities: A review of the literature. *British Journal of Special Education, 16,* 13–28.

Martin, J. E., Rusch, F. R., James, V. L., Decker, P. J., & Trtol, K. A. (1982). The use of picture cues to establish self-control in the preparation of complex meals by mentally retarded adults. *Applied Research in Mental Retardation, 3,* 105–119.

Mechling, L. C. (2005). The effect of instructor-created video programs to teach students with disabilities: A literature review. *Journal of Special Education Technology, 20,* 25–36.

Norman, J. M., Collins, B. C., & Schuster, J. W. (2001). Using an instructional package including video technology to teach self-help skills to elementary students with mental disabilities. *Journal of Special Education Technology, 16,* 5–18.

One Write Company. *Cyrano Communicator.* Lancaster, OH.

Orth, T. (2000). *Visual recipes: A cookbook for non-readers.* New York, NY: DRL Books, Inc.

Pierce, K. L., & Schreibman, L. (1994). Teaching daily living skills to children with autism in unsupervised settings through pictorial self-management. *Journal of Applied Behavior Analysis, 27,* 471–481.

Rehfeldt, R. A., Dahman, D., Young, A., Cherry, H., & Davis, P. (2003). Teaching a simple meal preparation skill to adults with moderate and severe mental retardation using video modeling. *Behavioral Interventions, 18,* 209–218.

Robinson-Wilson, M. A. (1977). Picture recipe cards: An approach to teaching severely and profoundly retarded adults to cook. *Education and Training of the Mentally Retarded, 12,* 69–73.

Schleien, S. J., Ash, T., Keirnan, J., & Wehman, P. (1981). Developing independent cooking skills in a profoundly retarded woman. *Journal of the Association for the Severely Handicapped, 6,* 23–29.

Schuster, J. W. (1988). Cooking instruction with persons labeled mentally retarded: A review of literature. *Education and Training in Mental Retardation, 23,* 43–50.

Schuster, J. W., Gast, D. L., Wolery, M., & Guiltinan, S. (1988). The effectiveness of a constant time-delay procedure to teach chained responses to adolescents with mental retardation. *Journal of Applied Behavior Analysis, 21,* 169–178.

Schuster, J. W., & Griffen, A. K. (1991). Using constant time delay to teach recipe following skills. *Education and Training in Mental Retardation, 26,* 411–419.

Schuster, J. W., & Griffen, A. K. (1993). Teaching a chained task with a simultaneous prompting procedure. *Journal of Behavioral Education, 3,* 299–315.

Shipley-Benamou, R., Lutzker, J. R., & Taubman, M. (2002). Teaching daily living skills to children with autism through instructional video modeling. *Journal of Positive Behavior Interventions, 4,* 165–175.

Sigafoos, J., O'Reilly, M., Cannella, H., Upadhyaya, M., Edrisinha, C., Lancioni, G. E., et al. (2005). Compuer-presented video prompting for teaching microwave oven use to three adults with developmental disabilities. *Journal of Behavioral Education, 14,* 189–201.

Singh, N. N., Oswald, D. P., Ellis, C. R., & Singh, S. D. (1995). Community-based instruction for independent meal preparation by adults with profound mental retardation. *Journal of Behavioral Education, 5,* 77–91.

Steed, S. E., & Lutzker, J. R. (1999). Recorded audio prompts: A strategy to increase independent prevocational task completion in individuals with dual diagnosis. *Behavior Modification, 23,* 152–168.

Steege, M. W., Wacker, D. P., & McMahon, C. M. (1987). Evaluation of the effectiveness and efficiency of two stimulus prompt strategies with severely handicapped students. *Journal of Applied Behavior Analysis, 20,* 293–299.

Stephens, W. E., & Ludy, I. E. (1975). Action-concept learning in retarded children using photographic slides, motion picture sequences, and love demonstrations. *American Journal of Mental Deficiency, 80,* 277–280.

Swan, K. O., Swan, G. M., Van Hover, S. D., & Bell, R. L. (2002). A novice's guide to handheld computing. *Learning & Leading with Technology, 29,* 22–27.

Trask-Tyler, S. A., Grossi, T. A., & Heward, W. L. (1994). Teaching young adults with developmental disabilities and visual impairments to use tape-

recorded recipes: Acquisition, generalization, and maintenance of cooking skills. *Journal of Behavioral Education, 4,* 283–311.

Van Laarhoven, T., & Van Laarhoven-Myers, T. (2006). Comparison of three video-based instructional procedures for teaching daily living skills to persons with developmental disabilities. *Education and Training in Developmental Disabilities, 41,* 365–381.

Wolery, M., Ault, M. J., Gast, D. L., Doyle, P. M., & Griffen, A. K. (1991). Teaching chained tasks in dyads: Acquisition of target and observational behaviors. *The Journal of Special Education, 25,* 198–220.

Wright, C. W., & Schuster, J. W. (1988). Accepting specific versus functional student responses when training chained tasks. *Education and Training in Mental Retardation and Developmental Disabilities, 29,* 43–55.

Received: 8 March 2007
Initial Acceptance: 5 May 2007
Final Acceptance: 20 July 2007

Statement of Ownership, Management, and Circulation
(Act of August 12, 1970, Section 3685 Title 39, United States Code)

1. Title of publication: EDUCATION AND TRAINING IN DEVELOPMENTAL DISABILITIES. **2. Publication number:** 0013-1237. **3. Date of Filing:** September 30, 2008. **4. Frequency of issue:** Quarterly in March, June, September, and December. **5. No. of issues published annually:** 4. **6. Annual subscription price:** $40 domestic; $175 institution; $179.50 foreign. **7. Location of known office of publication:** The Council for Exceptional Children, 1110 North Glebe Road, Suite 300, Arlington, Virginia 22101-5704. **8. Location of headquarters of general business offices of the publishers:** The Council for Exceptional Children, 1110 North Glebe Road, Suite 300, Arlington, Virginia 22201-5704. **9. Names and addresses of publisher and editor:** Publisher—The Council for Exceptional Children, 1110 North Glebe Road, Suite 300, Arlington, Virginia 22201; Editor—Dr. Stanley H. Zucker, Special Education Program, Farmer 316, Arizona State University, Tempe, AZ 85287-2011. **10. Owner:** The Council for Exceptional Children, Division on Developmental Disabilities, 1110 North Glebe Road, Suite 300, Arlington, Virginia 22201-5704, no stockholders. [**11.** Not applicable.] **12. For completion by nonprofit organizations authorized to mail at special rates:** The purpose, function, and nonprofit status of this organization and the exempt status for Federal Income Tax purposes have not changed during the preceding 12 months. **13. Publication name:** EDUCATION AND TRAINING IN DEVELOPMENTAL DISABILITIES. **14. Issue date for circulation data below:** September 2008. **15. Extent and nature of circulation:**

	Average no. copies ea. issue for past 12 mos.	*No. of copies of issue nearest filing date*
A. Total no. copies printed	4,428	4,349
B. Paid circulation		
1. Sales through dealers and carriers, street vendors, and counter sales	0	0
2. *Mail subscription*	3,741	3,709
C. Total paid circulation	3,741	3,709
D. Free distribution by mail; samples, complimentary, and other free copies	150	125
E. Free distribution outside the mail; carriers or other means	0	0
F. Total free distribution	150	125
G. Total distribution	3,891	3,834
H. Copies not distributed		
1. Office use, left-over, unaccounted, spoiled after printing	537	515
2. Returns from news agents	0	0
I. Total	4,428	4,349
J. Percent paid and/or requested circulation	96.14%	96.74%

16. This statement of ownership will be printed in the Vol. 43 No. 4 DEC 08 issue of this publication.

17. Signature and title:
Bruce A. Ramirez Executive Director September 30, 2008