Peer-Implemented Time Delay Procedures on the Acquisition of Chained Tasks by Students with Moderate and Severe Disabilities

Janet Read Godsey
Christian County Schools, Hopkinsville, Kentucky

John W. Schuster, Amy Shearer Lingo, Belva C. Collins, and Harold L. Kleinert
University of Kentucky

Abstract: This study evaluated the effectiveness of and reliability of peer tutors implementing a constant time delay procedure when teaching four high school students with moderate and severe disabilities to prepare foods using picture recipes. We used a multiple probe design across subjects to determine the effectiveness of the peer tutor implemented constant time delay procedure on the acquisition of chained food preparation tasks. Data indicate that the tutors were effective in teaching the four students to prepare food using picture recipes. Peer tutors also implemented the procedure with a high degree of reliability. In addition, all students maintained the tasks at high levels and responded with 100% accuracy during the final maintenance assessment. Discussion includes a comparison of reliability data with other studies utilizing teacher-implemented constant time delay and chained tasks.

Finding the personnel required to provide high quality, individualized instruction for students with moderate and severe disabilities is one of the most difficult obstacles classroom teachers face. Because the intellectual and physical capabilities of many students with moderate and severe disabilities require repeated, systematic, individualized instruction, teachers often find that that students may have to do a lot of waiting and “seatwork” activities while teacher time is spent for individualized and small group instruction elsewhere. Teachers who have many students requiring this type of instruction find it nearly impossible to provide students with sufficient opportunities to respond during instructional sessions, thereby limiting the student’s opportunities in building acquisition skills to fluency, maintenance, and generalization levels (Kamps, Locke, Delquadri, & Hall, 1989).

Although placement of students with moderate and severe disabilities into general education classrooms has produced mixed reactions from educators and given the ever-growing number of peers without disabilities in high school special education classrooms in credit generating peer programs, it does provide an opportunity to utilize instructional assistance in the form of peer tutors. Classroom teachers may be reluctant to use this instructional arrangement for numerous reasons. First, teachers may wonder if peer-delivered instruction is as reliable or efficient as teacher and paraprofessional instruction. Second, they also may expect that peer tutors will lack the discipline to perform the procedures systematically. Finally, teachers may have concerns that peer tutors, even after extensive training, may not generalize their use of systematic procedures when assigned to teach different skills or with different students.

This study was the first author’s thesis and was completed as part of the requirements for a Master of Science degree in the Department of Special Education and Rehabilitation Counseling at the University of Kentucky. Correspondence concerning this article should be addressed to John W. Schuster, 229 Taylor Education Building, Department of Special Education and Rehabilitation Counseling, University of Kentucky, Lexington, KY 40506-0001. E-mail: jwschu01@uky.edu

© Division on Developmental Disabilities
Research has supported the use of peers when teaching skills to students with moderate and severe disabilities (e.g., Koury & Browder, 1986; Miracle, Collins, Schuster, & Grisham-Brown, 2001; Romer, Busse, Fewell, & Vadasy, 1985; Tekin-Iftar, 2003; Tekin & Kircaali-Iftar, 2002; Werts, Caldwell, & Wolery, 1996). For example, Kamps et al. (1989) used a multiple probe across behavior design to teach discrete tasks to two elementary school students with autism. Two fifth graders without disabilities served as peer tutors. Tutors used verbal reinforcement, instructive feedback, and model and verbal prompts to effectively teach skills such as identification of coins, naming of opposites, and reading comprehension.

Peer tutors also can successfully teach chained tasks to students with disabilities. Werts et al. (1996) taught elementary-aged peer tutors to implement an observational learning strategy to teach students with disabilities a variety of chained tasks. Target skills included sequencing numbers using tiles, playing a cassette tape, sharpening a pencil, using a calculator to compute simple addition problems, and using a computer game. The research found that peer tutors were successful in teaching the target skill and used the training procedure with a high degree of procedural reliability indicating that peer tutors can provide highly effective instruction of simple chained tasks.

In addition to research finding that peer tutors can effectively teach students with disabilities, studies also have addressed whether peers can deliver instruction as effectively and efficiently as teachers (Romer et al., 1985; Miracle et al., 2001). Romer et al. compared the efficiency of peer tutor instruction to teacher instruction on the performance of vocational skills by students classified as deaf-blind with severe mental retardation. Results indicated that acquisition measures of targeted skills by students were similar for both peer tutor instruction and teacher instruction. Students with disabilities, on the average, took fewer sessions to reach criterion with peer tutor instruction but required more assistance than for tasks taught by the teacher. Results indicated that there was little difference between peer instruction and teacher instruction. Additionally, Miracle et al. compared teacher-deliver instruction to peer-delivered instruction when teaching high school students with moderate disabilities to read sight words with the constant time delay procedure. An adapted alternating treatments design was used to compare the two interventions. Results indicated that peer-delivered and teacher-delivered instruction was effective. The teacher-delivered instruction occurred at a quicker pace (i.e., less time per session) but the differences were minimal.

Although research has demonstrated that peers can implement a variety of instructional strategies with discrete, and to a much lesser extent, chained tasks, there is little research involving peer tutors using systematic response prompting strategies (Wolery, Ault, & Doyle, 1992) like the system of least prompts, simultaneous prompting, and constant time delay. Tekin-Iftar (2003) researched the effectiveness of peer tutors in delivery of a simultaneous prompting procedure to four students, aged 10 through 13, with a variety of disabilities. The author found that peer tutors successfully (a) taught students with disabilities to expressively identify community signs and (b) embedded instructive feedback (i.e., definitions of the signs) in the consequent event. These results also occurred when Tekin-Iftar and Kircaali-Iftar (2002) had peer sibling tutors implement both constant time delay and simultaneous prompting to teach children with mental retardation to expressively name animals. The authors found that the tutors implemented both procedures reliably.

Constant time delay has been the subject of numerous studies and has been shown to be effective, easy to use, and more efficient than other near errorless strategies such as the system of least prompts (Schuster et al., 1998). Researchers have taught peer tutors to implement constant time delay with students with disabilities. Peer tutors without disabilities have successfully used constant time delay to teach basic sight word reading to high school students with moderate disabilities (Miracle et al., 2001), generalized reading of cooking labels to high schoolers with mental disabilities (Collins, Branson, & Hall, 1995), and sight word identification to elementary-aged students with severe disabilities (Wolery, Werts, Snyder, & Caldwell, 1994). All of these studies
show that peer tutors can reliably implement constant time delay procedures with discrete tasks.

The research studies described have supported the effectiveness of peer tutors as reliable implementers of systematic instruction. While few studies used peer tutors to teach chained tasks and several studies used constant time delay, no study could be found that has examined the effectiveness of peer tutors implementing constant time delay to teach chained tasks. This investigation was designed to answer the following research questions (1) Is a triadic instructional arrangement with instructor modeling and role-play effective in teaching high school-age peer tutors to implement the constant time delay procedure? (2) Will high school-age peer tutors without disabilities reliably implement the constant time delay procedure in teaching chained tasks across participants and over time? and (3) Will a peer tutor implemented constant time delay procedure be effective in teaching high school students with moderate and severe disabilities the acquisition and maintenance of chained cooking tasks?

**Method**

**Participants**

*Students.* Four students (all male), ranging in age from 15 to 20 years, enrolled in a public high school participated. All attended at least one general education class, lunch, and assemblies with students who did not have disabilities.

Jake, a 16-year-old student who on the *Wechsler Intelligence Scale for Children – WISC – III* (Wechsler, 1991), obtained an IQ of 40, was diagnosed with moderate mental retardation. Jake had a sight word vocabulary of 100-125 words, could read and respond to many environmental signs, proper nouns, and words from computer pull-down menus. He was unable to read simple directions. Jake wrote and verbalized his personal information (e.g., name, guardian’s name, etc.). He prepared simple snacks (e.g., cold cereal, microwave popcorn). He attended general education class for weightlifting and attended a social skills class and math class for students with mild mental disabilities. He went out of the building twice a week for vocational training at a local grocery store. Jake’s Individualized Education Plan (IEP) included objectives for using tools and equipment in a safe manner, following pictorial directions, behavior self-management, employability skills, and functional mathematics.

Louis, a 20-year-old student who obtained an IQ of 40 on the *Wechsler Adult Intelligence Scale* (Wechsler, 1997), was diagnosed with moderate mental retardation. He was in his fifth year of enrollment at the high school and attended general education classes in lifetime sports physical education, art, and food services technology. Louis had a sight word vocabulary of 150-200 words. He read and responded appropriately to many environmental signs, proper nouns, and commonly used words drawn from vocational experiences, and could prepare several simple foods from memory (such a cold cereal and microwave popcorn). He did need supervision to monitor proportions used (e.g., overflowing the cereal bowl with milk, etc.). He received vocational training in the community at the library and at a local community service agency 2-3 times a week. Louis was unable to comprehend written directions, and his IEP objectives were in the areas of food preparation, employability skills, and purchasing.

Charlie, a 15-year-old male with an IQ of 40 on the *WISC – III* (Wechsler, 1991), was diagnosed with moderate mental retardation, Down syndrome, and a severe speech deficit. He attended a general education class in physical education. Charlie went out of the building two times per week for community-based instruction in safety and shopping instruction. Charlie had a sight vocabulary of 25-30 words. He read and responded appropriately to many environmental signs, product names, and names of family members, teachers, and fellow students. His speech often was difficult to understand, and during the time of the study the teacher and speech pathologist were trying several voice-output devices to supplement speech. Charlie could follow verbal/model directions for making several simple snacks such as cold cereal and crackers with spreadables. Charlie was unable to read simple written directions, and his IEP included objectives in the areas of food preparation, following pictured directions, and self-monit-
toring of behavior. He received speech therapy at school 2 times per week.

Jonah, a 17-year-old male with a Kaufman Brief Intelligence Test (K-BIT) (Kaufman & Kaufman, 1990) composite score of 40, was diagnosed with moderate mental retardation, a moderate hearing impairment in one ear, and a severe visual impairment in the opposite eye. He attended general education classes in physical education and food services technology, and also was out of the building 1-2 times per week for community-based instruction in safety and shopping skills. Jonah had a sight word vocabulary of 25-50 words. He read and responded appropriately to many environmental signs, product names, and names of family, teachers, and fellow students. His speech often was difficult to understand, and at the time of the study was in the process of obtaining a dynamic-screen, voice-output augmentative communication device to supplement his speech. Jonah followed verbal/model directions for making several simple snacks such as cold cereal and crackers with spreadables. He followed 1-2 step instructions without redirection if given adequate processing time. Jonah was unable to read simple written directions, and his IEP included objectives in the areas of following pictured directions, communication, and self-care. He received weekly speech therapy and occupational therapy at school and services for vision impairment on a consultative basis.

**Peer tutors.** Eleven peer tutors, 2 males and 9 females, ranging in age from 16 to 18 years (high school juniors and seniors), and enrolled in a peer tutoring class for high school credit were tutors during the study. Five of the peer tutors were enrolled in advanced level classes and were on a pre-college curriculum. The other seven were enrolled in standard level classes and were on a vocational education track for either industry or business related fields. All tutors who participated met prerequisite skills including availability for after school training sessions, faculty performance ratings, and interest in the research study. Faculty performance rating forms were distributed to faculty members and they rated students’ personal characteristics and work ethic on a scale of 1 to 5 (5 was the highest rating). Students must have received an overall 3.5 from at least five faculty members in order to be eligible for participation.

**Setting**

All experimental sessions occurred in a kitchen/living area adjacent to the students’ self-contained classroom. Because the kitchen area was a separate room with a door that could be closed and because only one student at a time was permitted to be in the kitchen to prepare a snack, additional control for distractions did not occur.

**Materials/Equipment**

The teacher and/or peer tutors used the following materials: (a) digital camera for creating the pictorial recipes, (b) dishes and utensils, (c) food stored in cabinets, a refrigerator or freezer, (d) pictorial recipe cards with written directions beneath each photo with photos in sequence according to the task analysis and held in order by a large metal ring, (e) data sheets, and (f) reliability forms for the dependent and independent measures.

**Skill Selection**

All participating students had food preparation or the following of pictorial directions as objectives included on their IEP. In addition, the teacher interviewed the students’ parents, former teachers, and the students about the foods they would prefer to cook. After determining that the students had no prior experience in preparing the target recipes, the teacher screened the students for their ability to follow a verbal/model prompt and to motorically imitate specific skills required to prepare the target recipes. Target recipes for Jake and Louis included making a milkshake in the blender (27 critical steps) and making a grilled cheese sandwich (32 critical steps). Target skills for Charlie and Jonah included making a waffle in the toaster (27 critical steps) and making juice from a frozen concentrate (25 critical steps). In addition, each task analysis included a “turning the page” step in between each critical step for students to turn the pages of the picture recipe in order to see the next step.
General Procedures

The dependent variable was the percent of correct steps completed independently on the chained food preparation tasks. Peer tutors implementing the constant time delay procedure was the independent variable. Initially, peer tutor training occurred followed by skill selection of the target recipes. Then single opportunity baseline sessions occurred before training started (Schuster, Gast, Wolery, & Guiltinan, 1988). After the teacher collected stable baseline data, Jake began training on making a milkshake. When he reached or approached criterion, Jake started training on making a grilled cheese sandwich at the same time that Louis began training on making a milkshake. When Jake and Louis reached or approached criterion, Louis started training on preparing a grilled cheese sandwich while Charlie began training on toasting a waffle. When Charlie reached or approached criterion on making a waffle, he began training on making juice while Jonah began training on making a waffle. Then Jonah was trained to make juice. Intermittent maintenance probe sessions occurred on the average of once every 15 sessions for acquired tasks.

Peer Tutor Training

Prior to implementing the constant time delay procedure, the teacher trained the peer tutors through direct instruction, modeling, and triadic role-play with peer tutors acting the in the roles of data collector, prompter, and student (trainee). The teacher trained the peer tutors during two 90-minute after school sessions. During training sessions, the teacher taught the peer tutors how to implement the constant time delay procedure and to record student responses. At the conclusion of the training sessions each peer tutor had to demonstrate performance of data collection and implementation of constant time delay steps with at least 90% accuracy to participate. In addition to performance criteria, the teacher required the peer tutors to correctly answer at least 90% of questions on a written exam before they were allowed to participate in implementing the constant time delay procedure with the students. Twelve students initially completed training; however, one tutor failed to meet the criteria for inclusion. The 11 peer tutors randomly served as both prompter and data collector throughout the study and worked with a variety of students (i.e., peer tutors were not relegated to one role and assigned to one student).

Baseline Sessions

The teacher conducted a single opportunity baseline session on all eight skills (two skills per student) at the beginning of the study. Intermittent probe sessions occurred at least once every five sessions on untrained tasks for Jake and Louis and every 10 sessions for Charlie and Jonah to help control for repeated testing and maturation effects. Three consecutive baseline sessions occurred immediately prior to intervention on each task. The teacher used single opportunity probe sessions to help control for repeated testing and maturation effects as well as to reduce the costs associated with duplicate materials.

The teacher conducted all baseline sessions. During these sessions, the teacher gave students an attentional cue, a task request to make the food, and waited for a student’s response. If the student initiated a correct response within 5 s and completed the response within 20 s, the teacher recorded a correct response, provided verbal praise, and waited 5 s for the student to initiate the next step in the task analysis. The sessions continued until a student committed an error (i.e., did not initiate a response within 5 s, or initiated a response within 5 s but completed the wrong step, completed the step incorrectly, or took too long to complete the step). If this occurred, the student was praised for attempting the task and the session was terminated. In addition, at the end of the session, students were allowed to eat a snack (previously prepared by the teacher or student).

Training Procedures

After stable baseline data, training occurred. One peer tutor acted as the prompter and the other peer tutor as the data collector. For each task for Jake, Louis, and Charlie, two 0-s sessions occurred. For Jonah, three 0-s sessions occurred. Thereafter, all sessions used a 5-s constant time delay procedure.
During 0-s sessions, the prompter gave an attentional cue, stated a task request (e.g., “Make ______”), immediately provided the controlling prompt (i.e., a verbal/model prompt of the step to be completed), and waited 5 s for a student response. If a student initiated a response, the prompter allowed the student 20 s to complete the step. After the prompter provided consequences for each step the tutor waited 5 s for the student to initiate the next step in the task analysis.

During 5-s sessions, the prompter gave an attentional cue, stated a task request (e.g., “Make the ______”), and waited 5 s for a student response. If no response occurred after 5 s, the prompter provided the controlling prompt and waited 5 s for the student to initiate the prompt. If the student initiated a response within 5 s, the prompter allowed the student 20 s to complete the response. After the prompter provided the consequences, the tutor waited 5 s for the student to initiate the next step in the task analysis.

The data collector recorded five possible responses during training sessions. The data collector recorded a correct response before the prompt (i.e., correct anticipation) when a student initiated a response before the controlling prompt and completed the step within 20 s. All correct anticipations resulted in specific verbal praise. The data collector recorded an incorrect response before the prompt (i.e., non-wait error) when a student initiated a response before the prompt but completed the step (a) out of sequence (sequence error), (b) incorrectly (topographical error), or (c) with too long of a duration (duration error). When these errors occurred, the prompter redelivered the controlling prompt and waited for a student response. If the student still did not complete a correct response, the prompter notified the teacher. When a student did not initiate a response within 5 s of the controlling prompt the data collector recorded a no response, and the prompter delivered an additional attentional cue and prompt while completing the step for the student.

At the end of each session, the student ate the prepared food. Training sessions continued until each student reached three sessions at 100% correct anticipations.

Maintenance

After criterion was reached on each task, the teacher conducted maintenance sessions at least once every 15 sessions until all students reached criterion on all cooking tasks. The trainer conducted these sessions like 5-s delay sessions.

Experimental Design

We used a multiple probe across subjects and behaviors design to demonstrate experimental control. Experimental control was demonstrated when a change occurred in the dependent variable when, and only when, the independent variable was applied and this change occurred across tiers in a time-lagged manner.

Reliability

Peer tutor training. A general education teacher collected procedural reliability data on the teacher’s implementation of the peer tutor training procedure during 100% of the training sessions. The teacher calculated these data by dividing the number of trainer behaviors observed by the number of trainer behaviors planned and multiplying by 100 (Billingsley, White, & Munson, 1980). Some of the trainer behaviors measured included providing definitions and examples of key terms, passing out materials, demonstrating the constant time delay procedure, having students role play, providing written examinations, and providing feedback.
Skill training. The teacher and one peer tutor collected both dependent and independent variable reliability data. They collected these data during 25% of all baseline sessions and 26% of all intervention sessions. The point-by-point method was used to calculate dependent variable reliability data (i.e., dividing the number of agreements by the number of agreements and disagreements and multiplying by 100). Procedural reliability data (i.e., independent variable reliability data) were calculated according to formula cited by Billingsley et al., 1980. Some of the behaviors measured, when appropriate, included delivering the attentional cue, stating the task request, waiting the appropriate delay interval, providing the controlling prompt, waiting the response interval, and providing correct consequences.

Results

Reliability Data

Reliability data of the instructor training, modeling and triadic role-play procedure for training the peers tutors indicated 100% accuracy during both peer tutoring training sessions.

During baseline sessions, student response reliability data (i.e., dependent variable) resulted in a 100% agreement. During intervention sessions when student data collectors recorded student responses, student response reliability resulted in a mean agreement of 98% (range 94-100%).

During baseline sessions conducted by the teacher, procedural reliability data resulted in an overall mean accuracy of 99.5% (range 98-100%) in following the required intervention behaviors. Procedural reliability data during intervention sessions indicated that the prompters followed the planned behaviors with an overall mean accuracy of 93.1% (range 84.99%).

Student Acquisition Data

Student acquisition data are displayed in Table 1 and Figures 1 and 2. Data are graphed using separate symbols to represent total task steps (the steps of turning the page between each picture card are included) with open squares and critical steps (turning page steps omitted) by open triangles. All students achieved criterion on all tasks. Overall, students required a total of 69 instructional sessions to reach criterion on all tasks. Individual students required between 6 and 12 sessions per task to reach criterion (an average of 8.6 sessions). Across all tasks, students committed a total of 40 errors through criterion. Individually, students committed between 3 and 11 errors per task for an overall error percentage of 1.04%. Error percentage was calculated by dividing the number of errors committed by the product of the total number of intervention sessions per skill by the total number of steps in each task analysis each student performed (Schuster et al., 1988). Of the 40 total errors, 39 (97.5%) were non-wait errors (i.e., errors before the prompt). The remaining error was a wait error (i.e., an error after the prompt) committed by Jake when acquiring the grilled cheese task.

Student Maintenance Data

Maintenance data indicate that Jake and Charlie maintained all tasks with 100% accuracy throughout the length of the study. Louis’ performance decreased to 94% of total task steps and 96% of critical steps during the second maintenance probe session but returned to 100% accuracy during the final maintenance probe session. The teacher did not collect maintenance data on Jonah due to the end of the school year.

<table>
<thead>
<tr>
<th>Student</th>
<th>Skill</th>
<th>Number of Sessions Through Criterion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jake</td>
<td>Milkshake</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Grilled Cheese</td>
<td>7</td>
</tr>
<tr>
<td>Louis</td>
<td>Milkshake</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Grilled Cheese</td>
<td>9</td>
</tr>
<tr>
<td>Charlie</td>
<td>Waffle</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Juice</td>
<td>6</td>
</tr>
<tr>
<td>Jonah</td>
<td>Waffle</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Juice</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>69</td>
</tr>
</tbody>
</table>
Discussion

The first research question this study sought to answer concerned the effectiveness of a peer tutor-training program consisting of instructor modeling and triadic role-play. High procedural reliability data for these training sessions occurred. Eleven of the 12 peer tutors selected to participate in this study met both the written and performance criteria within the allotted time. Both dependent and independent variable reliability data collected during intervention sessions supports the effectiveness of the peer tutor training procedure. The fact that peer tutors were counterbalanced across students and tasks suggests that the peer tutor training procedure was effective in programming for peer tutor generalization across different students and different tasks within the cooking curricular area. The success of this program contributes to the peer tutoring literature through replicating, in part, the peer tutor training procedures used by Collins et al. (1995). However, while the Collins et al. study addressed peer tutoring...
with discrete tasks, results of this study extend the expectations of peer tutors’ abilities to chained task instruction, increasing their versatility in the classroom.

The second research question addressed the degree of reliability with which peer tutors could implement constant time delay in teaching chained tasks. Dependent variable reliability data indicate that overall peer tutors collected student response data with 98% agreement (range = 94-100%) with the reliability observer. Peer tutors as a whole were able to implement the response prompting strategy with 93% accuracy (range = 84-99%). Wolery, Bailey, and Sugai (1988) state reliability above 90% is desirable, above 80% is acceptable. Nine out of the 11 peer tutors performed the steps of the constant time delay procedure with 90% or better accuracy.

Results of the peer tutoring reliability data

Figure 2. Percent of correct responses for Charlie and Jonah during baseline, intervention, and maintenance sessions.
in this study contribute to the peer tutoring literature due to the similarity to studies utilizing teacher-implemented constant time delay. Numerous studies (e.g., Braham, Collins, Schuster, & Kleinert, 1999; Fiscus, Schuster, Morse, & Collins, 2002; Graves, Collins, Schuster, & Kleinert, 2005; Griffen, Wolery, & Schuster, 1992; Hall, Schuster, Wolery, Gast, & Doyle, 1992; Miller & Test, 1989; Miracle et al., 2001; Schuster et al., 1988) using constant time delay with chained tasks have shown that teacher-delivered instruction with this procedure has resulted in similar levels of acceptable and desirable procedural reliability data.

There were some interesting findings when using peer tutors to deliver the instruction. First, most of the errors made by peer tutors involved not providing descriptive verbal praise after each correct response. When given feedback about this omission, many questioned the need for a continuous reinforcement schedule. The peer tutors complained that it “felt unnatural” to praise students for every step. This could be of significant interest in future research, considering that failure to provide continuous verbal praise did not appear to adversely affect student acquisition. Second, having peer tutors work in pairs as prompter and data collector resulted some disagreement at times. For example, peer tutors would disagree on the amount of butter that was spread on the bread and therefore whether the response was correct or not. Other similar differences of opinion also occurred that required the teacher to intervene.

The third research question addressed the effectiveness of peer-tutor implemented constant time delay on the acquisition and maintenance of chained cooking tasks by students with moderate and severe disabilities. Data indicate that students only acquired the skills when the time delay procedure was implemented. Intervention data indicate that students reached criterion quickly with no overlap between baseline and intervention conditions. A low occurrence of errors with noted absences of wait and no response errors may support the peer tutors’ effectiveness in providing clear, consistent, verbal/model prompts. Maintenance data show that students retained the skills up to 22 sessions after meeting criterion. The noticeable lack of variability in student response data supports the interpretation that student acquisition was not adversely affected by the interchanging of peer tutor roles as data collector and prompter and across students.

Several other findings about the intervention are noteworthy. First, each student, there was a slight increase in baseline data percentages in the second skill after the first zero second session occurred in the first skill. This was most likely due to the fact that the first few steps of the pictorial recipes were identical (e.g., select recipe book, wash hands, etc.). In each of these instances, the baseline data became stable prior to intervention. Second, it should be noted that each student learned their second task in fewer sessions than their first. This could be the result of (a) the second task being easier than the first (though this is doubtful given that two different sets of skills were targeted), or (b) students were “learning to learn” a picture recipe with constant time delay. Third, the overall error percentage in this study (i.e., 1.04%) is lower than reported in the constant time delay chained task literature (Schuster et al., 1998). This is especially noteworthy given that peer tutors delivered the instruction.

When teaching tasks that contain consumables, costs should be considered. Grocery items for this study amounted to $74.03. Students purchased groceries during community-based instruction trips using funds from an annual community-based budget provided by the school district. The district supplied the camera, disks, and ink cartridges as each special education classroom in the district received these materials to assist in developing student alternate portfolios and instructional materials. The district also provided the computer, printer, paper, and laminating film. The teacher spent $84.00 of her personal funds on various fast food gift certificate as incentives for peer tutors to remain as participants throughout the study.

Results of this study are significant for classroom teachers in that they demonstrate the value and capability of peer tutors in delivering quality one-on-one instruction to students with moderate and severe disabilities. Because students with these disabilities often are placed in the same classroom, time and personnel to meet the individual needs of such a
heterogeneous group of students is difficult. If peer tutors can provide the same or similar quality of instruction as classroom teachers and instructional assistants for particular tasks, classroom staff may take on more of supervisory role, while students receive more time for one-on-one instruction. Freeing up time for classroom teachers may allow them to more closely monitor the effectiveness of instructional procedures and to modify instruction in a timelier manner. Furthermore, peer tutor instruction may be preferable to students with disabilities because it may be perceived a more enjoyable and less stigmatizing than instruction from an adult, especially if it is paired with opportunities to develop social relationships. If the teacher promotes development of social relationships and emphasizes the role of peer tutors as same-age learning partners rather than “mini teachers”, students may perceive the instruction from peer tutors favorably. It may be helpful for future research to address such social validity issues.

This study contributes to the literature in several ways. First, it contributes to the time delay literature because no study has addressed teaching chained tasks through the use of peer tutors. Second, it contributes to the peer tutoring literature because we could find no study that addressed peer tutors teaching chained tasks with a systematic response prompting strategy with high school students. However, the study was limited in external validity because of the small number of participants. It also may be difficult to replicate the study in settings where peer tutors are not graded for performance (as in this study where peers were enrolled in a credit generating class) or in settings where peer tutors cannot be trained at the same time during large blocks of time. Further research should train peer tutors to use other systematic instructional procedures with chained tasks, train students to perform chained tasks from other instructional domains, or to use response prompting strategies in community based settings. In future studies it may be wise to include generalization measures for both peer tutors and students with respect to using other materials in other settings. Future studies also may address whether peer tutors could reliably code student errors (i.e., duration, sequence, or topographical) or implement the procedure alone, acting as both data collector and prompter.

References


Miller, U. C., & Test, D. W. (1989). A comparison of constant time delay and most-to-least prompting in teaching laundry skills to students with moder-


