EFFECTS OF CONCURRENT SELF-MONITORING ON SPECIAL EDUCATION

PRESERVICE TEACHERS’ USE OF LEARNING TRIALS

A Dissertation in

Special Education

by

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ABSTRACT

Traditionally, teacher preparation programs rely on feedback from supervisors to promote generalization of trained instructional practices to the classroom setting. With classroom visits limited by time and financial constraints, supervisors must focus their feedback on a small number of instructional practices. Implementation of self-monitoring allows pre-service teachers to collect information on instructional behaviors, therefore providing feedback on the behavior without the direct involvement of supervisors. This study explored the use of self-monitoring as a form of feedback for preservice teachers. Specifically, effects of concurrent self-monitoring on percentage of completed learning trials and rate of completed learning trial delivery, effects of goal setting and graphing in conjunction with self-monitoring, and social validity of the intervention were explored. Results indicate self-monitoring positively affected percentage of learning trials completed by teachers, but had modest results on rate of learning trials delivered. The addition of goal setting and graphing had idiosyncratic effects on the rate of completed learning trial delivery. Furthermore, use of the self-monitoring procedure received favorable ratings from all of the participants.
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CHAPTER 1
INTRODUCTION

The need for effective instruction is indisputable. In fact, one study found students who were in classes with effective teachers for three consecutive years achieved 50% more learning than students in classes with poor teachers during that same time period (Sanders & Rivers, 1996). Teacher implementation of effective instructional practices has a direct relationship with student achievement. In order to implement effective teaching practices, teachers must be knowledgeable about the practice and able to implement the practice in a classroom setting (Burns & Ysseldyke, 2009; Rose & Church, 1998).

Fortunately, a body of research on effective teaching strategies exists to help guide practice. Effective instruction is explicit, provides opportunities for practice, and includes feedback (Archer & Hughes, 2011; Rosenshine & Stevens, 1986; Swanson, 1999; Swanson & Hoskyn, 2001; Vaughn, Gersten, & Chard, 2000). Interactions between students and teachers that exemplify effective instruction lead to active student engagement with content (Rosenshine, 1979) and increase academic learning time (i.e., the amount of time students are successfully engaged in an activity). In turn, this increase in academic learning time leads to increases in student achievement. Providing students opportunities to respond to academic content is one way teachers can increase academic learning time.

Increasing the number of opportunities to respond (i.e., questions or prompts from the teacher) increases student engagement (Conroy, Sutherland, Snyder, & Marsh, 2008; Greenwood, Delquadri, & Hall, 1984). However, providing opportunities to respond alone does not guarantee student learning. As teachers provide more opportunities for students to respond, it is also necessary to provide feedback to students affirming or correcting their responses. Such feedback ensures students are proficient with the content. The combination of opportunities to
respond and feedback create a unit of instruction called a *learning trial*. Increased learning trials consistently correspond with enhanced student learning (Albers & Greer, 1991; Carnine & Fink, 1978; Greer, 2002; Ingham & Greer, 1992) and represent a key component of effective instruction, which should be evident in every classroom.

Unfortunately, effective teaching practices, such as completing learning trials, are not evident in every classroom. Even when teachers are trained to identify effective instructional practices through university courses, a lack of connection to classrooms results in practices that are rarely implemented in natural teaching settings (Noell, Witt, Gilbertson, Ranier, & Freeland, 1997; Smith, Parker, Taubman, & Lovass, 1992; Sterling-Turner, Watson, Wildmon, Watkins, & Little, 2001). A clear link between university-based training and k-12 settings must be established. That is, generalization must occur in order for teachers to utilize the skills developed in pre-service or in-service training within various classroom settings, across subject areas, and with different students (Scheeler, 2008; Stokes & Baer, 1977).

Many methods have been suggested to promote generalization of behaviors. In their often cited article, Stokes and Baer (1977) list nine strategies that may be used to promote generalization: train and hope, sequential modification, introduce to natural maintaining contingencies, train sufficient exemplars, train loosely, use indiscriminable contingencies, program common stimuli, mediate generalization, and train to generalize. More recently, Scheeler (2008) adapted these strategies specifically for teacher training. In this review Scheeler identified four procedures to promote teacher’s use of effective instruction: (1) provide immediate feedback during acquisition of the new instructional behaviors, (2) train to mastery level on teaching strategies, (3) provide performance feedback to teachers in the classroom, and (4) program for generalization by including common stimuli across training and generalization
environments. Within the generalization procedures identified by Stokes and Baer (1977), Scheeler and colleagues (Scheeler, Bruno, Grubb, & Seavey, 2009) suggest the generalization strategy of programming common stimuli (i.e., including the same stimuli in training and generalization settings) as the most relevant to teacher preparation programs. Inclusion of common stimuli from both the university training setting and natural classroom setting will act as a prompt for teachers to perform the skill learned in training.

Although programming common stimuli increases the likelihood that generalization will occur, feedback in the classroom is also necessary to insure proper implementation of the trained instructional behavior. Traditionally, feedback and monitoring associated with generalization has been provided by a consultant (e.g., university supervisor, mentor teacher) (Scheeler, 2008; Stokes & Baer, 1977), thereby making mediation of generalization limited by the time and availability of supervisors (Stein, 1975; Smith et al, 1992). Frequency of supervisor visits often declines for programs without adequate funding or qualified supervisory personnel (Capizzi et al., 2010; Giangreco & Doyle, 2004; Stein, 1975; Smith, Parker, Taubman, & Lovass, 1992). Supervisors also cannot observe every instance of instruction and may miss key opportunities for feedback exchanges. Past studies suggest teachers are able to generalize behaviors learned during training to classroom settings when monitoring and feedback are provided in the generalization setting (i.e., their classrooms) (Hall, Grundon, Pope, & Romero, 2010; Jahr, 1998; Lerman, Vorndran, Addison, & Kuhn, 2004; Martens, Hiralall, & Bradley, 1997; Noell et al., 1997). However, without adequate supervision and feedback, pre-service teachers may not generalize effective instructional practices to the classroom setting (Gersten, Vaughn, Deshler, & Schiller, 1997).
Self-Monitoring to Promote Generalization of Effective Instruction

Given some of the potential difficulties with on-site supervision, one way to ensure the availability of a generalization mediating procedure is to provide teachers a method to help regulate their own teaching behaviors through self-monitoring. Self-monitoring is a sub-process of self-regulation and involves the observation and recording of one’s own targeted behaviors (Mace, Belfiore, & Hutchinson, 2001; Mace & Kratochwill, 1988). Each time a behavior is identified and recorded, the recording acts as a consequence for the participant’s behavior. Often this immediate consequence mediates the time between a behavior and long-term outcomes, which may be too removed in time, and therefore, increases the likelihood of the behavior occurring in the future (Mace & West, 1986; Nelson & Hayes, 1981). In classroom settings, self-monitoring may make the occurrence of instructional behaviors more salient, thus providing important feedback regarding implementation of research-based practices, especially during times when supervisors are inaccessible.

Researchers (e.g., Anderson & Freiberg, 1995; Griffin & Kilgore, 1995; Hoover & Carroll, 1987; Kalis, Vannest, & Parker, 2007; Keller, Brady, & Taylor, 2005; Nelson, Hay, Hay, & Carstens, 1977; Roskos, Boehlen, & Walker, 2000; Szykula & Hector, 1978; Workman, Watson, & Helton, 1982) have used self-monitoring to increase teaching behaviors. This research has taken two tracks. In the first, researchers (Kalis et al., 2007; Keller et al., 2005; Nelson et al., 1977; Sutherland & Wehby, 2001; Szykula & Hector, 1978; Workman et al., 1982) examined effects of self-monitoring on behavior management practices (e.g., delivery of verbal praise). Increases in teacher use of specific praise were demonstrated after teachers were trained to observe and record their use of praise in the classroom. In the second track, researchers (Anderson & Freiberg, 1995; Griffin & Kilgore, 1995; Hoover & Carroll, 1987; Roskos,
Boehlen, & Walker, 2000) explored effects of self-monitoring on instructional behaviors, at times with equivocal results. There are several possible reasons for the modest effects found in these instructional studies. First, unlike studies focused on one discrete behavior (e.g., teachers recording the frequency of specific praise with hand-counters or tally marks), the targeted instructional behaviors were described vaguely, leaving much open to teacher interpretation (e.g., discouraging call-outs, setting purpose prior to reading, wasting little instructional time). Second, studies focused on instructional behaviors utilized more complex self-monitoring procedures. These procedures included the use of checklists (Anderson & Freiberg; Hoover & Carroll), questionnaires (Griffin & Kilgore), and transcription (Roskos et al.) to monitor as many as 12 different instructional behaviors. Third, self-observation was sometimes based on indirect data collection methods, such as teacher recall of the lesson, not actual observation (Griffin & Kilgore, 1995). Although a potentially effective method to increase the use of research-based instructional practices, the lack of objective behavioral definitions for target behaviors, complexity and number of behaviors selected for recording, and potential issues with the validity of the recording procedures, may have contributed to the equivocal results found in self-monitoring studies (literature review found in Appendix A).

Perhaps past research focused on self-monitoring of instructional behavior failed to produce robust positive outcomes because components of effective self-monitoring, as identified in the literature (Keller et al., 2005; Mace & Kratochwill, 1988; Mohoney & Thoresen, 1974; Schunk, 2008), were not included in the procedures. Lylo (2011) suggested that teacher trainers should consider three issues when developing self-monitoring procedures. First, the behavior selected for self-monitoring should be objectively defined. As people are not naturally accurate observers, accurate observation is likely connected to the clear behavior definition and simple
recording procedure (Mahoney & Thoresen, 1974). Second, the desired dimension of the instructional behavior must be chosen. As the dimension of behavior (i.e., rate, duration) monitored will likely be the one targeted for change, it must be an aspect of behavior likely to impact long-term outcomes. For example, if teacher questioning is targeted for increase, it would be of greater benefit for the teacher to self-monitor the frequency of questions rather than the duration of each question. Third, a procedure to support generalization of behavior must be established. As suggested by Scheeler (2008), use of common stimuli in training and generalization environments is one method to promote generalization of trained skills.

The purpose of this study was to examine the effects of self-monitoring on instructional behaviors in a school setting. Prior research was used in developing the procedures for self-monitoring. First, preservice teachers monitored an objectively defined behavior, completed learning trials. A learning trial contains an antecedent (e.g., a teacher question), behavior (e.g., student answer), and consequence (e.g., either praise or corrective feedback from the teacher) (Albers & Greer, 1991; Greer, 2002). Increased rates of learning trials have repeatedly been linked to greater academic achievement for students (Albers & Greer; Greer). Second, because completion and rate of learning trial delivery are linked closely with student learning, dimensions that demonstrated this effect (i.e., percent of completed trials and rate of completed learning trial delivery) were documented. Third, a procedure to support generalization was included. In past studies (Kalis, Vannest, & Parker, 2007; Nelson, Hay, Hay, & Carstens, 1977), teachers self-monitored and increased use of a discrete skill (i.e., praise statements), by using hand-counters to record the frequency of behavior as it occurred. Beyond providing a means for concurrently recording behaviors (i.e., recording behaviors simultaneously with instruction delivery), hand-counters also have the potential make the performance of the behavior more salient and serve as
a conspicuous reminder to implement trained behaviors. If teachers incorporate effective self-monitoring procedures by concurrently recording each learning trial with a conspicuous hand counter, increased completion and delivery of learning trials will likely be evident. Finally, prior research (Keller, Brady, Taylor, 2005; Sutherland & Wehby, 2001) in this area suggests that a package comprised of self-monitoring, graphing of self-monitored data, and goal setting may produce more robust results than self-monitoring alone. Graphing offers a method to visually examine performance and quickly monitor progress (Cohen & Spruill, 1990; Taney & Gast, 1984). Graphic displays of data are often connected to positive changes in performance (Fuchs & Fuchs, 1986; 1987). Setting specific goals based on previous performance also positively impacts behavior (Harkins & Lowe, 2000; Locke & Lantham, 2002). In combination with self-monitoring, graphing and goal setting may increase teacher’s use of learning trials and by extension student performance.

By adding concurrent recording and graphing with goal setting to the elements of effective self-monitoring (i.e., selection of instructional behaviors, selection of the desired dimension of instructional behavior, and generalization support), this study examines the effects of a self-monitoring package on teacher’s use of learning trials during instruction. Specifically, this study addresses the following questions:

(1) What are the effects of concurrent self-monitoring on pre-service teachers’ percentage of completed learning trials in a self-monitored content area?

(2) What are the effects of concurrent self-monitoring on pre-service teachers’ rate of completed learning trial delivery in a self-monitored content area?

(3) What are the effects of goal setting and graphing in conjunction with self-monitoring on pre-service teachers’ use of learning trials?
(4) What are the effects of concurrent self-monitoring in one content area on pre-service teacher completion of learning trials in a second content area in which self-monitoring is not occurring?

(5) Are self-monitoring methods socially valid in the context of pre-service student teaching?
CHAPTER 2

METHODS

The goal of this study was to examine the effects of two self-monitoring procedures on teacher delivery of learning trials. To accomplish this goal, participants were trained to deliver learning trials during instruction and concurrently record (i.e. record data while teaching) each completed trial. The additional procedural step of goal setting and graphing was added after the initial intervention. Data were collected from audio recordings of the lessons and analyzed to identify changes in teacher behavior. Additional data were collected from a participant completed questionnaire regarding the usefulness and ease of self-monitoring procedures.

Participants and Setting

Volunteers were recruited from a cohort of 10 undergraduate student teachers who completed coursework and a field experience focused on the components and implementation of explicit instruction from a special education teacher preparation program at a large northeastern university. Student teachers had no teaching experience beyond previous practicum placements. Prior to a seminar at the start of student teaching, the researcher explained she was recruiting participants for a study on teaching and learning. More specifically, she told the cohort that participation in the study would require completing approximately one hour of training, audio recording lessons, and recording behaviors during short portions of their lessons. Benefits of the study were also presented and included the potential to improve instructional behaviors, access to data at the completion of the study, and a monetary stipend if selected for participation. From the cohort, nine student teachers volunteered to participate (see Appendix B for consent form) and four participants were selected based on the approval of their building principal, cooperating teacher; as well as, parent and student consent for audio recording.
The four participants were female undergraduate students in their final semester of a special education program. All participants were completing a bachelor’s degree in special education. All were assigned student teaching positions in a small, metropolitan school district in the northeastern United States; Helen taught in an elementary academic support classroom for students with mild to moderate disabilities, while Claire and Michelle taught in middle school academic support classrooms for students with mild to moderate disabilities. Elizabeth was assigned to an elementary autism support classroom. Before beginning the study, each participant identified one content area she would be teaching most frequently (i.e., self-monitored content area). Helen and Elizabeth selected reading, while Claire selected math and Michelle focused on writing. Each participant selected an additional content area they would be teaching throughout the teaching experience (i.e., generalization content area). Helen selected spelling, Elizabeth selected math, and Claire and Michelle selected reading. All participants began data collection, but Elizabeth did not continue with data collection after two initial recordings citing student absences and changing curriculum. The other three participants collected data throughout their student teaching placements.

**Data Collection, Experimental Design, and Agreement**

In order to evaluate the effects of the self-monitoring intervention, teachers were asked to record self-monitored lessons (i.e., intervention lessons); as well as, generalization lessons each week. Data were collected by the researcher from the audio recordings of the lessons. Before recording, participants informed the students in the class that the lesson will be audio recorded both verbally and in a letter sent home to parents (see Appendix C for a copy of the letter). Audio files were recorded using a microcassette recorder and included the entire self-monitored lesson and the lesson from the generalization content area. Audio files produced were collected every
other day by the primary researcher. Next, audio files were analyzed by the primary researcher to identify the number of completed learning trials present during the review of prerequisite skills in both of the lessons.

A completed learning trial includes a teacher prompt, student response, and teacher feedback (Alber & Greer, 1991; Greer, 2002). As the method of data collection was audio recordings, all of the components had to include an auditory component (e.g., tap, verbal sound, clap). Data were collected on a sheet containing a three-column table labeled with the headings teacher prompt, student response, and teacher feedback. A checkmark was placed in each column as the behavior was evident on the audio recording. If a teacher prompt was repeated before the student responded, a checkmark for each repetition was placed in the cell of the three-column table. From the data collected, percentage of completed learning trials and rate of learning trial usage were also calculated. Percentage of completed learning trials was calculated by dividing the number of completed learning trials by the total number of teacher prompts and multiplying the quotient by 100. Rate of learning trial usage per minute was calculated by dividing the number of completed learning trials by the duration of the review and multiplying the quotient by 60 (see Appendix D for the data analysis forms). Accuracy data on participants’ self-monitoring were also collected by comparing each participant’s frequency of learning trial completion to the data obtained by the researcher. Accuracy for each session was calculated by comparing the data and dividing the smaller number by the larger number and multiplying the quotient by 100.

Concurrent self-monitoring of learning trial completion was evaluated using a multiple-probe across participants design. As with all single subject research, characteristics of this design include an operationally defined dependent variable, an actively manipulated independent
variable, and the inclusion of baseline and comparison conditions (Horner et al., 2005).

Experimental control within a multiple-baseline design is demonstrated when a change in the dependent variable occurs simultaneously with implementation of the independent variable and is determined through visual comparison between conditions and across participants (Horner et al.).

**Procedures**

There were five phases to the proposed study: group training, baseline, self-monitoring, self-monitoring + graphing + goal setting, and fading. Participants transitioned to the next phase when a minimum of five moderately stable data points were collected. Procedures for each phase are detailed in the following sections.

**Group training.** In Phase One, participants reviewed key elements of effective instruction. As all participants had previously demonstrated mastery (i.e., grade of B or higher) in a course covering this content, the training session was used to assess their continued understanding of effective instructional behaviors. During the 60 min group training session, the primary researcher first addressed the six functions of effective instruction: (a) review, (b) presentation, (c) guided practice, (d) corrections and feedback, (e) independent practice, and (f) weekly and monthly reviews (Rosenshine & Stevens, 1986; Archer & Hughes, 2011). For each teaching function the researcher defined the skill, discussed its importance, modeled an example, and then asked each participant to demonstrate or describe how they would implement the skill in their classroom. Imbedded in the review of the six teaching functions were lesson format guidelines, examples of prompting to achieve high rates of responses, and examples of feedback. Additionally, participants were specifically asked to define a review of prerequisite skills (i.e., the appraisal of student knowledge of previously taught skills related to the lesson objective
occurring at the beginning of a lesson) (Archer & Hughes). Verbal responses from participants, which incorporated the essential elements of each lesson component were used as an indication of mastery. Each participant provided an appropriate description or example of each lesson function before the conclusion of the training session (See Appendix D for a detailed outline of introductory training and copies of training materials). Proof of mastery of content was essential before beginning data collection, as self-monitoring is a strategy which focuses on performance rather than acquisition of a behavior. Beginning the intervention with participants who did not possess knowledge of effective instruction would have been inappropriate both for the participants and the purposes of this study.

**Baseline.** After completing training, participants selected and recorded lessons in two separate content areas (e.g., a math and social studies). Participants were asked to select content areas they taught frequently and included a review of prerequisite skills. The content area each participant taught most frequently became the content area used for the self-monitoring intervention. The content area taught less frequently was used by the primary researcher to collect generalization data. Just prior to beginning each lesson, the participant activated an audio recorder. During the lesson, the participant started a timer and depressed the hand-counter button once to indicate the beginning of the review. At the end of the review the hand-counter button was depressed again and the timer was stopped. Use of the hand-counter and timer was meant to familiarize participants with the instruments and eliminate possible novelty effects when the intervention began. After completing the lesson, participants deactivated the recorder. The researcher was not present in the classroom during the lessons.

**Self-monitoring.** After Baseline, the self-monitoring procedure was instituted in a staggered fashion across participants. A brief training was conducted by the researcher with the
each participant to introduce the self-monitoring procedure. Training for self-monitoring utilized a model-prompt-check method of instruction. First, the researcher modeled several learning trials and demonstrated the use of the hand-counter for self-monitoring of completed learning trials. A completed learning trial must include an antecedent (i.e., teacher prompt), behavior (i.e., student response), and consequence (i.e., teacher feedback). Both examples (i.e., completed trials) and non-examples (i.e., incomplete trials) were presented. After modeling, the participant was asked to take on the role of the teacher and demonstrate a complete learning trial with the researcher acting as the student. Once the participant correctly demonstrated two completed learning trials, a baseline lesson recording from that participant was played and the participant was asked to use the hand-counter to tally the number of completed learning trials. Data collected by the participant was compared to the number of learning trials counted by the researcher and research assistant. Feedback was given based on this comparison (i.e., further instruction regarding the elements of a learning trial) and this procedure was repeated until the participant’s results matched the researchers’ results. See Appendix F for a complete outline of the training procedure.

Once training was completed, the researcher instructed participants to begin self-monitoring during the primary content lessons. The researcher stated: “Begin to use the hand-counter to monitor your use of learning trials during the review of prerequisite skills portion of your intervention lesson. Record learning trials as we practiced at the completion of each learning trial. Immediately after the lesson, copy the number of learning trials from the hand-counter to the data card provided. Also, continue to time the review and record this data on the data card. Calculate the rate of learning trial use by using the time and number of learning trials recorded. Continue to Record the additional content area but do not use the hand-counter or
timer during that lesson. Place both the self-monitoring data card and microcassette in the envelope provided. A printed copy of the directions is included with the materials. To make sure I was clear, please tell me what you will do during your data collection lesson.” A copy of the directions is located in Appendix F.

Upon completion of the lesson, participants recorded the number shown on the counter and the time on a 7.62 by 12.70 cm index card. Using the recorded data, participants calculated rate on the card and then placed that card and corresponding microcassette in an envelope.

If necessary, it was emphasized that participants should self-monitor only during intervention (i.e., most frequently taught) content area lessons and not during additional (i.e., generalization) content area lesson. Participants implemented the intervention by continuing to audio record the same content area lessons with the addition of counting learning trials with a hand-counter during the review of prerequisite skills at the beginning of the data collection lesson. Learning trials were counted by the participants during the actual lesson review; the audio file was only used by the researcher. The content areas recorded were the same as baseline. Audio files were collected and analyzed as in the first baseline.

**Self-monitoring + graphing + goal setting.** Once at least five data points were collected or a stable data path was evident during the self-monitoring phase, participants were asked to graph their results and set a goal for future lessons. A procedure similar to that used during the self-monitoring training was used to instruct the participants on graphing procedures. During training, the researcher provided a graph labeled with the number of learning trials on the vertical axis and the date and time of the lesson and graphing on the horizontal axis. The researcher modeled how to record the date and time of the lesson and the date and time of graphing. Further, the researcher demonstrated how to place the recorded rate on the graph by using the
first two frequency counts from the previous phase. Next, the researcher prompted the participant to complete the information on the horizontal axis and graph a data point using the data from the self-monitored lessons. Finally, the participant was asked to perform the task independently while the researcher monitored accuracy. If the participant made an error, the researcher returned to the prompt step of instruction for additional practice.

Once graphing was mastered, participants were asked to set a goal for the rate of completed learning trials used per minute during instruction. Participants were trained set a goal based on review of previous data and research-based guidelines. During training, the researcher modeled setting a stringent goal based on graph of mock data and The Council for Exceptional Children (CEC) guidelines for optimal rates of opportunities to respond. According to the CEC guidelines, teachers should elicit 4 to 6 responses per minute during instruction of new material and 8 to 12 responses during independent practice (CEC, 1987). Criterion for responses during a review of prerequisite skills (i.e., a level of practice between novel and independent) would logically fall in the area between 6 to 8 responses per minute. The training provided by the researcher included the introduction of the criterion levels and a model of how to establish the mean of the previous data. During the modeled goal setting, a mean of the data from the self-monitoring phase below the suggested criterion indicated a goal would be set between 6 to 8 responses per minute. A mean greater than the criterion level, the goal would be set equivalent to or greater than the mean + 1. Throughout the models, the participant was asked to supply information regarding calculation the mean and CEC guidelines. The participant was then prompted to select a rigorous but achievable goal following the modeled guidelines provided by the researcher. Finally, the participant was given a graph with a space for a goal and asked to independently set a goal for the next phase. Following training, all procedures continued as in
the previous phases but the participant additionally used the graph with the goal to record all collected data. See Appendix G for a training outline and sample graph.

**Fading.** With end of semester time constraints only one participant (i.e., Helen) completed any fading sessions. During this fading session, use of the hand-counter was discontinued but it was placed in view of the teacher during instruction. Had time permitted, the hand-counter would have been removed from the room and eventually the recorder would have been removed from view.

**Social Validity**

Social validity refers to the extent to which goals, interventions, and outcomes are acceptable to participants (Cooper, Heron, & Heward, 2007; Finney, 1991; Wolf, 1978). As participants’ perceptions likely affect behavior change and future use of an intervention, social validity data collected directly from the participants provides information highly relevant to the effectiveness of the intervention. Social validity data was collected at the completion of the study. Participants were given a questionnaire to complete independently. Questions elicited information regarding the following: (a) participants’ perceived changes in instructional behavior, (b) use of the hand-counter, and (c) potential use of self-monitoring in the future. Questionnaires were completed anonymously and returned to the primary researcher in a sealed envelope. When the initial questionnaires were received, the primary researcher showed each participant the graphed data from the study (i.e., percentage of completed learning trials and rate of learning trial use). A follow-up questionnaire was given to participants asking for their reaction after seeing the results. For the complete questionnaire see Appendix H.

**Interobserver agreement**
Agreement data were collected by a research assistant trained to identify completed learning trials. The research assistant was trained during a 30 min session, which included defining learning trials, modeling the identification of both examples and nonexamples of learning trials, and guided practice using the baseline recordings. In order to check mastery of data collection procedures, the assistant was asked to listen to a 3 min. audio recording, which contained nine completed learning trials. Mastery was achieved when the primary and assistant researcher independently recording data and reached 100% agreement.

Interobserver agreement data were collected for at least 30% of the sessions for each participant during baseline, intervention, and fading. Interobserver agreement was calculated by dividing the number of agreements by the sum of agreements and disagreements and multiplying the quotient by 100. Mean interobserver agreement for each participant during baseline was 98.5% (range = 97% to 100%) for Helen, 93.3% (range = 91% to 96.8%) for Claire, and 93.8% (range = 87.5% to 100%) for Michelle. Mean interobserver agreement for each participant during the self-monitoring intervention was 94.9% (range = 89.7% to 100%) for Helen, 95.9% (range= 93.3% to 98.4%) for Claire, and 97.4% for Michelle. For the two participants who completed the self-monitoring + graphing/goalsetting intervention, mean interobserver agreement was 100% (range = 100%-100%) for Helen and 96.5% for Claire. Finally, interobserver agreement was calculated for Helen as she completed the fading session; agreement for the session was 100%.
CHAPTER 3

RESULTS

The intervention focused on improvement of teachers’ implementation of completed learning trials during the review of prerequisite skills. Results include data on two dimensions of learning trials: percent complete (see Table 1) and rate of delivery (see Table 2). These dimensions represent the amount of feedback given compared to the number of opportunities and the rate at which completed learning trials were delivered. Each dimension is presented for each participant through each phase of the study: baseline, self-monitoring, self-monitoring + graphing/goal-setting, and fading. Data on learning trial completion were also collected from recordings in an additional content area (i.e., generalization). In the generalization sessions, participants audio-recorded lessons but did not monitor the number of learning trials completed. Generalization content areas were recorded less frequently by participants and primarily during the Baseline phase. Participants cited scheduling changes due to weather, testing, and student needs as the reason for the infrequent recordings. Finally, social validity data are presented.

Individual Results

Three undergraduates (i.e., Helen, Claire, Michelle) majoring in special education implemented the self-monitoring procedure during their student teaching experiences. Although all experiences were in the same school district in special education settings, there were variations in both setting and number of phases completed during the study. Data for each participant is presented for percent of learning trials completed and rate of delivery of learning trials for both self-monitored content areas and generalization content areas. Agreement data for each participant is also presented.
**Helen.** Helen self-monitored reading instruction in an elementary school academic support classroom for students with mild to moderate disabilities. From Baseline to Self-Monitoring, Helen’s mean percent of completed trials increased 35.8% and rate of delivery increased by 1.5 learning trials per minute (see Tables 1 & 2; Figures 1 & 2). When graphing and goal setting were added, Helen’s mean completed learning trials decreased by 2%, but rate of trial delivery increased an additional 4.4 learning trials. Upon implementation of the first session of the fading procedure, Helen’s percent complete returned to 100%, but rate decreased by 0.7 learning trials.

For her generalization sessions, Helen recorded four lessons in the content area of spelling during baseline with a mean percentage completion of 75.5%, and rate of 7.9 complete learning trials per minute. Percentage of completed trials decreased 31.5% and rate decreased 5.9 learning trials during the self-monitoring + graphing/goal setting phase. During the fading phase, Helen’s percent of complete trials increased by 6% and rate increased by 0.38 learning trials. Helen’s accuracy (i.e., mean agreement with the primary researcher) for frequency of completed learning trials was 93.3% during the self-monitoring phase and 94.3% during the self-monitoring + graphing/goal setting phase.

**Claire.** Claire self-monitored math instruction in a middle school academic support classroom for students with mild to moderate disabilities. From Baseline to Self-Monitoring, Claire’s mean percent of completed trials increased 4.7% and rate of delivery decreased by 0.5 learning trials per minute (See Tables 1 & 2; Figures 1 & 2). When graphing and goal setting were added, Claire’s mean completed learning trials increased by 4.4%, but rate of trial delivery decreased an additional 0.5 learning trials. Completion of fading sessions was prevented by the conclusion of the student teaching experience. For her generalization sessions, Claire recorded
two lessons in the content area of reading during baseline with a mean percentage completion of 82.5%, and rate of 2.2 complete learning trials per minute. As Claire did not collect generalization data while using the self-monitoring procedure, no further comparisons can be made. Claire’s accuracy (i.e., mean agreement with the primary researcher) for frequency of completed learning trials was 80.1% during the self-monitoring phase and 91.4% during the self-monitoring + graphing/goal setting phase.

**Michelle.** Michelle self-monitored writing instruction in a middle school academic support classroom for students with mild to moderate disabilities. From Baseline to Self-Monitoring, Michelle’s mean percent of completed trials increased 32.5%, and rate of delivery increased by 4.0 learning trials per minute (See Tables 1 & 2; Figures 1&2). Completion of graphing/goal setting and fading sessions was prevented by the conclusion of the student teaching experience. For her generalization sessions, Michelle recorded five lessons in the content area of reading during baseline with a mean percentage completion of 56%, and rate of 3.1 complete learning trials per minute. As Michelle did not collect generalization data while using the self-monitoring procedure, no further comparisons can be made. Michelle’s accuracy (i.e., mean agreement with the primary researcher) for frequency of completed learning trials during the self-monitoring phase was 90.7%. Agreement during the self-monitoring + graphing/goal setting phase was not calculated for Michelle as she did not complete any sessions.

**Social Validity**

All three participants anonymously completed two questionnaires related to the use of the self-monitoring procedure. Results from the first social validity questionnaires indicate that all three participants were aware of a behavior change as a result of the self-monitoring intervention. Specifically, participants stated that they were “more aware” of providing feedback to students.
during the review of prerequisite skills. Each participant also rated how easy or difficult it was to use the hand counter to record data while teaching on a five point scale from easy to difficult. One of the participants rated the procedure as “easy”, while the other two participants rated the procedure as “somewhat easy”. The participants who ranked the procedure as “somewhat easy” stated that “after a day or two it became automatic” and that “sometimes I forgot I was counting”. When asked if they would use a hand counter to record an instructional behavior in the future, all three participants responded, “yes”. Within additional comments, one participant stated that she “increased her awareness of reinforcement rates and [use of the hand counter] was beneficial for students because it provides motivation to increase response rates.

After completing the first social validity questionnaire, participants were shown the results of the study. A second questionnaire was given to the participants, which asked if they were pleased with the results of the intervention. Two of the participants indicated that they were pleased and said the results were “amazing” and “interesting”. The third participant expressed a desire to see a greater change in the data.

Summary

Learning trial completion was positively impacted by participant use of self-monitoring in the self-monitored content area. Variability in learning trial completion apparent during Baseline also decreased in the self-monitoring phase and self-monitoring + graphing/goal setting phase (See Figure 1). Rate of completed learning trial delivery increased for two of the participants (See Figure 2). Accuracy of recording as indicated by agreement calculations between participants and the researcher all exceeded 80%. Additionally, social validity data indicated that this intervention was acceptable in the context of student teaching.
Table 1.

*Percentage of Completed Learning Trials*

<table>
<thead>
<tr>
<th>Participants</th>
<th>Baseline</th>
<th>Self-Monitoring</th>
<th>Self-Monitoring + Graphing/Goal Setting</th>
<th>Fade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>Range</td>
<td>M</td>
<td>Range</td>
</tr>
<tr>
<td>Self-Monitoring Content Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helen Reading</td>
<td>64.2</td>
<td>38-75</td>
<td>100</td>
<td>100-100</td>
</tr>
<tr>
<td>Claire Math</td>
<td>86.9</td>
<td>27-100</td>
<td>91.6</td>
<td>77-97</td>
</tr>
<tr>
<td>Michelle Writing</td>
<td>61.2</td>
<td>33-77</td>
<td>93.7</td>
<td>89-100</td>
</tr>
<tr>
<td>Generalization Content Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helen Reading</td>
<td>75.5</td>
<td>42-100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Claire Math</td>
<td>82.5</td>
<td>75-90</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Michelle Writing</td>
<td>56</td>
<td>31-75</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Table 2.

Rate of Completed Learning Trial Delivery per Minute

<table>
<thead>
<tr>
<th>Participants</th>
<th>Baseline M</th>
<th>Range</th>
<th>Self-Monitoring M</th>
<th>Range</th>
<th>Self-Monitoring + Graphing/Goal Setting M</th>
<th>Range</th>
<th>Fade M</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Monitored Content Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helen Reading</td>
<td>6.8</td>
<td>4.9-10.5</td>
<td>8.3</td>
<td>6.5-9.7</td>
<td>12.7</td>
<td>9-16.2</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>Claire Math</td>
<td>6</td>
<td>2.2-8.8</td>
<td>5.5</td>
<td>77-97</td>
<td>5</td>
<td>5.6-4.4</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Michelle Writing</td>
<td>3.7</td>
<td>2.3-4.5</td>
<td>7.7</td>
<td>5.3-11.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Generalization Content Area</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Helen Reading</td>
<td>7.9</td>
<td>3-20</td>
<td>-</td>
<td>-</td>
<td>2.0</td>
<td>1.2-2.73</td>
<td>2.38</td>
<td>-</td>
</tr>
<tr>
<td>Claire Math</td>
<td>2.2</td>
<td>2.4-2.1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Michelle Writing</td>
<td>3.1</td>
<td>2.4-4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Figure 1. Percentage of learning trials completed across phases. SM = self-monitoring phase. SM+G/GS = self-monitoring plus graphing and goal setting phase. Participant name and content area taught are listed for each graph.
Figure 2. Rate of learning trials completed per minute across phases. SM = self-monitoring phase. SM+ G/GS = self-monitoring plus graphing and goal setting phase. Participant name and content area taught are listed for each graph.
CHAPTER 4

DISCUSSION

Traditionally, teacher preparation programs rely on feedback from supervisors to promote generalization of trained instructional practices to the classroom setting. Often limited by time and financial constraints, which may result in fewer classroom visits, supervisors must focus their feedback on a small number of instructional practices. Fortunately, the amount of feedback on instructional practices can be increased through use of self-monitoring. Self-monitoring allows pre-service teachers to collect information on instructional behaviors, therefore providing feedback on the behavior without the direct involvement of supervisors. This study explored the use of self-monitoring as a form of feedback for preservice teachers on their use of discrete instructional behaviors, completion and delivery of learning trials. More specifically, we examined effects of concurrent self-monitoring on percentage of completed learning trials and rate of completed learning trial delivery, effects of goal setting and graphing in conjunction with self-monitoring, effects in a content area that was not self-monitored, and social validity of the intervention.

Literature (Keller et al., 2005; Mace & Kratochwill, 1988; Mohoney & Thoresen, 1974; Schunk, 2008) on self-monitoring suggests that effective self-monitoring procedures require: (a) the selection of objectively defined instructional behaviors, (b) the selection of the desired dimension of instructional behavior for monitoring, and (c) generalization support. In addition to considering these characteristics, this study attempted to increase the effectiveness of self-monitoring procedures by (a) implementing graphing and goal setting in order to enhance the saliency of the dimensions of behavior, and (b) using common stimuli to record behaviors concurrent with teaching to further support generalization. Findings indicated self-monitoring of
completed learning trials increased the percentage of completed learning trials, but had no clear effect on the rate of learning trials completed during self-monitored lessons. The addition of graphing and goal setting had idiosyncratic effects across participants. Of the two participants who implemented graphing, one increased percentage of completion and decreased rate of delivery, while the other participant decreased percentage of completion and increased rate of delivery. Social validity data indicate the procedure was user friendly and produced a change in behavior that was identifiable by the participants. With these findings, the present study extends the research base for self-monitoring of instructional behaviors by examining the effects of concurrent self-monitoring, graphing and goal setting, and common stimuli in conjunction with an effective self-monitoring procedure.

**Use of Concurrent Self-Monitoring of Discrete Behaviors**

Learning trial completion is an instructional behavior that can be clearly defined by the presence of a prompt, student response, and teacher feedback. As self-monitoring procedures are most effective with clearly defined behaviors, the increase of percentage of completed learning trials for all three participants was predictable, based on previous research (Kalis et al., 2007; Keller et al., 2005; Nelson et al., 1977; Sutherland & Wehby, 2001; Szykula & Hector, 1978; Workman et al., 1982). The self-monitoring procedure likely increased the saliency of each component of learning trials (i.e., prompt, response, feedback), and the act of recording provided reinforcement for the presence of each observed component (Mace, Belfiore, & Hutchinson, 2001).

As concurrent use of hand-counters increased teacher use of praise statements in previous studies (Kalis, Vannest, & Parker, 2007; Nelson, Hay, Hay, & Carstens, 1977), hand-counters were selected to allow teachers to record completed learning trials as they were teaching.
Although hand-counters enabled the preservice teachers to record learning trial completion as the behavior occurred, one initial concern was interference with instruction or technical difficulties for teachers. Results from the social validity questionnaires indicate that all participants found the procedure “easy” or “somewhat easy” and stated they would use the self-monitoring procedure in the future. It appears that self-monitoring during a limited amount of lesson time (i.e., review of pre-requisite skills) and use of hand-counters allowed for concurrent recording of behavior while remaining minimally distracting to the participants. Use of hand-counters also improved at least one aspect of instruction as all participants achieved higher percentages of learning trial completion while using the hand-counter to self-monitor.

Although the self-monitoring procedure produced increases in percentage of learning trial completion for all three participants, differential effects indicate that other variables may affect self-monitoring in classroom settings. The self-monitoring procedure appeared to be most effective for the two participants (i.e., Helen and Michelle) who had the lowest percentages of completed learning trials during baseline. While Helen and Michelle both increased the percentage of completed learning trials by over 30% during self-monitoring, Claire with a higher percentage during baseline only increased by 4.7%. Claire’s mean percentage of completed learning trials during the self-monitoring phase (i.e., 91.6%) was also slightly lower than both of the other participants (i.e., 93.7% and 100%). Variation in content, length of reviews, and initial level of teacher proficiency may partially explain these differential effects.

Both Helen and Michelle used brief reviews to cover key concepts in reading and writing in a verbal question/answer format during a 1-2 min review session. This format allowed the Helen and Michelle to incorporate more teacher prompts while planning the lesson and control delivery of prompts during instruction. However, Claire reviewed a large number of math fact
flash cards. Use of flashcards and length of review (i.e. over 10 min) may have affected Claire’s ability to complete learning trials as consistently as her colleagues. With the student holding the flashcards, it was impossible to plan additional prompts or control the delivery of the prompts. Claire’s initial level of completion (i.e., 86.8%) may have also created a ceiling effect, eliminating the possibility of a large increase during the self-monitoring phase. Based on the results obtained here it appears that self-monitoring is best suited for student teachers who have consistently low levels of learning trial completion. Additionally, the use of flashcards may have been more conducive to providing feedback, as turning the cards may have served as a cue to provide feedback. Future researchers should empirically examine the differential effects of self-monitoring across participants with similar initial performance levels and similar content. Once similarity is established, researchers can examine the effects of media-based self-monitoring procedures. That is, can the same effects occur with data collected via audio or video later in the day?

**Goal Setting and Graphing a Dimension of Behavior**

Prior research (Keller, Brady, Taylor, 2005; Sutherland & Wehby, 2001) in self-monitoring of praise statements suggested that the addition of graphing and goal setting to self-monitoring may produce more robust results than self-monitoring alone. In the present study, goal setting and graphing self-monitoring rate of delivery data had different effects for the two participants. Upon setting a goal and graphing, Helen set and surpassed a goal of 10 completed learning trials per minute; conversely, Claire did not meet her goal of 7 completed learning trials and actually decreased her rate compared to the self-monitoring only phase.

There are several plausible explanations for these differences. As with differences in percent of completed learning trials, rate of learning trial delivery may have been affected by the
settings and content areas for each participant. Helen increased her rate of delivery while teaching reading in an elementary learning support classroom. Claire decreased her rate of delivery while teaching math in a middle school learning support classroom. With reading, Helen asked questions as prompts and therefore had more control over the rate of prompting and length of responses (e.g., asking questions which require short or long responses). Claire, however, used math flashcards, which allowed the student to control the speed of prompts. The direct student control over the prompts may explain Claire’s consistent rate of completed learning trial delivery across the phases of the study. While Claire could have adjusted the rate of prompt delivery by controlling the cards, she chose to allow the student to set pace. It is possible that this pace was set because the student was unable to respond any faster.

Graphing and goal setting increased the rate of learning trial delivery for 1 of 2 participants. Many factors may have contributed to this discrepancy (i.e., initial skill level of participants, content area, and student performance) and further research is necessary to determine if graphing and goal setting will impact rate of learning trial delivery for a larger group of teachers. Future researchers may examine the effects of graphing on different dimensions of behavior and in different content areas.

Effects of Common Stimuli

Common stimuli used in both training and classroom settings promote generalization of mastered instructional practices (Scheeler et al., 2009). In the present study, participants were specifically trained to self-monitor using elements (i.e. hand counter, audio recorder) for a particular purpose of using those elements as common stimuli in a set classroom. The presence of the audio recorder and hand-counter in the natural classroom setting served as a reminder to first, incorporate learning trials into the lessons and second, to complete the learning trials.
During the generalization sessions, the concurrent self-monitoring procedure was not completed by participants. Helen was the only participant to complete generalization sessions and both her percentage of completed learning trials (-31.5) and rate of learning trial delivery (-5.9) decreased from Generalization Baseline levels. For at least one participant, the focus on learning trial completion and delivery reviewed during training and cued by the hand-counter was essential to adapt this behavior to new content areas. This requirement for explicit training and use of the hand-counter was surprising as it was assumed participants would increase levels of learning trial completion and delivery in the generalization content area as a result of the recording and observation procedures similar to the self-monitoring content area. Fortunately, the hand-counter may not be necessary to maintain the behavior. Limited learning trial completion and rate of delivery data during the fading phase indicate gradual withdrawal of the common stimuli (i.e., hand-counter and recorder) may be possible without compromising levels of performance. Similar finding during fading of common stimuli were found with student teachers by Scheeler and colleagues (2009). Unfortunately, levels of performance did decrease once the common stimuli were completely removed (Scheeler et al., 2009). When fading this strategy in practice, it may be necessary to increase the amount of time spent at criterion level or fade use of the common stimuli more slowly. Future research must investigate various aspects of the fading procedure (e.g., level of mastery prior to fading, duration of fading procedure) to ensure the behavior generalization brought about through use of common stimuli is not lost.

Limitations

Although positive results were achieved, limitations exist within the study, which should be noted. Specifically issues related to the nature of student teaching experiences, selection of the monitored behavior, use of audio recordings for data collection, and the absence of student
performance measures. Using student teachers as participants ensured a similar level of training, but the role of student teacher also provided many challenges. First, student teachers had little control over the content, context, or amount they were teaching. Participants were assigned particular content areas and assigned to a variety of special education settings. While these differences are indicative of typical practicum experiences and increase the external validity of the study, internal validity was affected to some extent. This decreased experimental control appeared to have the greatest impact in the generalization content areas. As the student teachers selected the content area they taught most frequently as the focus for self-monitoring, the other content areas were taught less frequently and therefore provided fewer opportunities for data collection. The schedule for student teaching is also very brief (i.e., 16 weeks) and was disrupted by school holidays and state-wide testing. These disruptions to the teaching schedule limited the amount of data collected by teachers.

For this study, the self-monitored behavior was selected by the researcher. Participants were naïve to several factors that influenced the selection of the behavior. Specifically, the factors included the selection of a behavior with a discrete definition and the identification of appropriate dimensions of the behavior to record. Researcher selection of the behavior had unknown effects on participant behavior.

Use of audio recordings was also a limitation. Although audio recorders were less invasive and more acceptable to cooperating teachers and principals, the lack of visual data possibly affected collection of data on non-verbal prompts, responses, and feedback. With visual data, agreement between participant and researcher data may have increased due to the ability of the researcher to view non-verbal feedback (e.g., thumbs up, nod) which the participant counted while self-monitoring.
Finally, data on student performance was not collected during this study. Although the instructional behavior selected for this investigation is highly correlated with student achievement, it is impossible to make any definitive statements regarding student outcomes based on these data.

**Conclusion**

Self-monitoring procedures have been used by teachers for over three decades to change a variety of teaching behaviors. This study attempted to increase the effectiveness of a self-monitoring procedure by using graphing, goal setting, and common stimuli in conjunction with established self-monitoring components of past studies (i.e., (a) selection of instructional behaviors, (b) selection of the desired dimension of instructional behavior, and (c) generalization support). As all participants increased the percentage of completed learning trials, the self-monitoring procedure was effective for this group of preservice teachers. Concurrent self-monitoring positively impacted preservice teachers’ verbal completion of learning trials for student teachers in several special education settings. The elements of this combined self-monitoring strategy appear to be effective, but findings are limited by lack of replication in the data.

Most notably, this study demonstrates the utility of incorporating common stimuli into a self-monitoring procedure as a method of programming generalization of instructional behaviors. Based on the past generalization research (Stokes & Baer, 1977; Scheeler, 2008; Scheeler et al., 2009), common stimuli are an effective means to program for instruction. Within this study, common stimuli were incorporated into a concurrent self-monitoring strategy used both in training and in the classroom setting. On a larger scale, this strategy may be useful in university classrooms as a way to program for generalization to the student teaching classroom setting. As
the intervention is minimally intrusive and appealing to teachers, this may be an appropriate intervention to supplement preservice teacher supervision.

This study is one step toward identifying a self-monitoring procedure that increases effective instruction and is valid within the context of a classroom. Pre-service teachers were able to use self-monitoring as a method to increase performance of a discrete behavior. This method may be beneficial as a supplement to supervisor feedback during practicum experiences. With additional feedback provided through the self-monitoring procedure, preservice teachers will be better equipped to generalize a greater number of skills learned in the university classroom to the practicum setting.
References


Appendix A

Review of Literature

Training a teacher to mastery on a skill that will not be implemented in the classroom is not beneficial to the teacher or the teacher’s students. Teachers who provide effective instruction first master elements of effective instruction and then implement them in their classrooms. Therefore, novice teachers must be able to successfully demonstrate effective instructional skills both in the training setting and in the classroom setting. Through exploration of professional literature, elements of effective instruction and methods to promote generalization are identified. Specifically, this review focuses on past studies which investigated teacher use of combinations of self-monitoring, graphing, and goal-setting to increase generalization of teaching behaviors. First, dependent variables of each study are compared to effective teaching behaviors identified in the professional literature. Next, independent variables are compared to methods of generalization. Through the exploration of both dependent and independent variables, elements of a self-monitoring procedure which are likely to promote generalization of effective instructional behaviors are identified.

Effective Instruction

Once a decision is made about the content of instruction, teachers must present that content in a way that maximizes the learning of all students. In the most basic terms, instruction is not occurring if the student is not learning. Effective instruction is explicit, provides opportunities for practice, and includes feedback (Archer & Hughes, 2011; Rosenshine & Stevens, 1986; Swanson, 1999; Swanson & Hoskyn, 2001; Vaughn, Gersten, & Chard, 2000). Implementation of effective instructional practices has repeatedly been linked to greater academic achievement for students. (Brophy & Good, 1986; Heward, 2003; Lovitt, 1996).
A key factor of effective instruction is the amount of academic learning time within a given lesson. Academic learning time is the amount of time students are successfully engaged in an activity, increases in academic learning time directly correspond with increased student achievement (Albers & Greer, 1991; Archer & Hughes, 2011). In order to increase academic learning time, students must first be engaged and secondly be proficient with the information. Teachers have the ability to influence the amount of academic learning time by adjusting their instructional behaviors. One method of maximizing student engagement is increasing the number of opportunities to respond. By providing more questions, prompts, or cues for students, teachers are able to increase students’ active engagement with the lesson content (Conroy, Sutherland, Snyder, & Marsh, 2008; Greenwood, Delquadri, & Hall, 1984). As teachers provide more opportunities for students to respond, it is also necessary to provide feedback to students affirming or correcting their responses. Such feedback ensures students are proficient with the content. The combination of opportunities to respond and feedback create a unit of instruction called a learning trial. The most basic unit used by teachers to involve students and increase correct responses, a learning trial occurs when students encounter information through a three term contingency trial (Greer, 2002). The three term contingency consists of student and teacher interactions including an antecedent, behavior, and consequence. Specifically, this interaction between students and teachers typically includes a prompt provided by the teacher, the student’s response, and teacher provided feedback. Increased learning trials consistently correspond with increased student engagement and proficiency (Albers & Greer, 1991; Carnine & Fink, 1978; Greer, 2002; Ingham & Greer, 1992) and represent a key component of effective instruction which increase academic learning time.
Generalization of Effective Instruction

Best practices in instruction are crucial to academic achievement, but are not always used consistently in classrooms (Rose & Church, 1998). This gap between research and practice is partially attributed to deficient training in research based practices (Burns & Ysseldyke, 2009). However, even when appropriate training is available, the lack of connection to classrooms results in practices that are rarely generalized to the classroom setting (Noell, Witt, Gilbertson, Ranier, & Freeland, 1997; Smith, Parker, Taubman, & Lovass, 1992; Sterling-Turner, Watson, Wildmon, Watkins, & Little, 2001). So then, even when training programs provide instruction to teachers on best practice, there are no guarantees that best practices are implemented with students in k-12 classrooms.

In a meta-analysis of teachers’ implementation of effective practices, Joyce and Showers (2002) reported 60% of teachers receiving training were able to demonstrate the new skill, while only 5% could implement the skill in their classrooms. If only 5% of teachers can implement effective practices after training, teacher preparers must take steps to increase the generalization of trained skills. Defined as the occurrence of a behavior under non-training conditions, generalization must occur in order for teachers to utilize the skills developed in pre-service or in-service training within various classroom settings, across subject areas, and with different students (Scheeler, 2008; Stokes & Baer, 1977). Even when a behavior change is accomplished in one setting, it can not be assumed the new behavior will generalize to other settings. It is necessary to program for generalization (i.e., build in procedures to ensure generalization in the target setting or activity) (Stokes & Baer).

Many methods have been suggested to promote generalization of behaviors. In a 2008 review of literature focused on teachers’ ability to generalize, Scheeler identified four procedures
to promote teacher’s use of effective instruction: providing immediate feedback during acquisition of the new behavior, train to mastery level, program for generalization, and provide performance feedback in the classroom. Within the generalization procedures, Scheeler includes five specific suggestions to program for generalization of effective instruction: program common stimuli, sequential modification, train sufficient exemplars, natural maintaining contingencies, and mediate generalization (2008). Of the five suggestions to generalize for effective instruction, programming common stimuli (i.e., including the same stimuli in training and generalization settings) is the most relevant to teacher preparation programs. Inclusion of common stimuli in both the university training setting and natural classroom setting will act as a prompt for teachers to perform the skill learned in training. Although this procedure increases the likelihood that generalization will occur, feedback in the classroom is necessary to ensure proper implementation of the trained behavior. This is supported by studies that suggest teachers successfully generalize behaviors (e.g., fading prompts, reinforcing appropriate student behaviors) learned during training to classroom settings when monitoring and feedback were provided in the generalization setting (i.e., their classrooms) (Hall, Grundon, Pope, & Romero, 2010; Jahr, 1998; Lerman, Vorndran, Addison, & Kuhn, 2004; Martens, Hiralall, & Bradley, 1997; Noell et al., 1997).

After new skills have been trained to mastery during in-service or pre-service training programs, use of behavior focused feedback provided by a trained observer in the classroom increased the number of teachers implementing a new behavior from 60% to 95% (Joyce & Showers, 2002). Traditionally, feedback and monitoring associated with generalization have been provided by a consultant (e.g., university supervisor, mentor teacher) (Scheeler, 2008; Stokes & Baer, 1977), thereby making mediation of generalization limited by the time and
availability of supervisors (Stein, 1975; Smith et al, 1992). One possible solution to ensure the mediation procedure is always available is to provide teachers a method to help regulate their own teaching behaviors through self-monitoring.

**Self-Monitoring**

Whether termed *reflection* or *introspection*, people often observe their past and present behaviors. Less often, people systematically observe and record their behavior, a practice known as *self-monitoring*. More precise than either reflection or introspection, which are likely to be affected by memory or shifting definitions of the behavior, self-monitoring involves defining the behavior in measurable units and creating a system to accurately record the behavior (Mahoney & Thoresen, 1974). The purpose of this systematic approach is either to assess or stimulate behavior change. Self-monitoring was initially used to assess behavior change for behaviors which are private in nature (e.g., bulimics’ purging behavior) and resulted from other treatments (e.g., keeping a food log). From these origins, it became evident that self-monitoring was also viable as a treatment to either increase desirable behaviors (e.g., exercise, time spent studying) or decrease undesirable behaviors (e.g., smoking, overeating) (Mahoney & Thoresen).

The mechanism underlying self-monitoring, reactivity, is explained through both a cognitive-behavioral perspective (Kanfer, 1975; 1977) and an operant model (Rachlin, 1974). Both theories recognize self-monitoring is a sub-process of self-regulation with the recording acting as a consequence for the participant’s behavior. The theories differ when explaining the mechanism related to the response. Cognitive-behavioral theory focuses on a three stage process beginning with self-monitoring and progressing through internal self-evaluation as the mechanism for reactivity, while operant theory does not recognize the internal self-evaluative process and focuses on the environmental contingences of the self-monitoring process (Mace &
According to operant theory, recording acts as an immediate consequence which mediates the time between a behavior and long-term outcomes, and therefore, increases the likelihood of the behavior occurring in the future (Mace & West, 1986; Nelson & Hayes, 1981). Beyond the basic components of observing and recording behavior, many other elements influence the behavior change associated with self-monitoring procedures. While researchers have little control over participants’ self-observation of behavior, many elements of self-recording can be manipulated within self-monitoring procedures. Specifically, these variables affect three aspects of self-recording: reactivity, accuracy, and procedures. By exploring different variables affecting the recording portion of self-monitoring procedures, it is possible to identify components with the most impact on behaviors of interest.

**Reactivity of Recording.** The greatest changes in behavior are noted when the consequence (i.e., self-recording) is continuous and immediate (Mace, Belfiore, & Hutchinson, 2001). More specifically eight variables are identified as affecting reactivity: target behavior valence (e.g., praise is viewed positively while reprimands are viewed negatively), motivation, topography of the target behavior (e.g., jumping behavior is represented each time both feet leave the ground simultaneously), schedule of recording (e.g., continuous, intermittent), concurrent response requirements (e.g., recording two behaviors), timing of recording (e.g., behavior recorded immediately after the behavior occurs), feedback (e.g., graphs of data or observer notes), and nature of the recording device (e.g., obtrusive or unobtrusive recording device) (Korotitsch & Nelson-Gray, 1999). Personal attributes of the participants also affect the level of reactivity. For example, participants’ level of motivation affects the reactivity with highly motivated participants changing behavior more dramatically. Beyond personal attributes, procedures can also be controlled to maximize reactivity. Effective procedures include
monitoring of an easily identified behavior, recording at every occurrence, and monitoring of only one behavior during each session. Finally, recording devices used to record should be obtrusive, allow behavior to be recorded as it occurs, and provide easily understood feedback. Although each factor is thought to maximize reactivity, self-monitoring methods are often adapted to meet the requirements of the setting in which they are used (Schunk, 2008).

**Accuracy of Recording.** Five variables are thought to affect both accuracy and reactivity (i.e., topography of the behavior, nature of the recording device, valence of the behavior, number of variables recorded, and timing of recording), but the two processes remain independent (Korotitsch & Nelson-Gray, 1999). Although accuracy is not necessary for reactive self-monitoring effects (Broden, Hall, & Mitts, 1971; Marshall, Lloyd, & Hallahan, 1993; Nelson, Hay, Hay, & Carstens, 1977), it remains practically important as self-monitoring is often used because it is assumed to be more accurate and sensitive than recall or reflective questionnaires (Korotitsch & Nelson-Gray). Additionally, overlap in the factors affecting both accuracy and reactivity is substantial and allows for both elements to increase by following the procedure of monitoring one positively valenced behavior with a conspicuous recording device concurrent with the occurrence of the behavior.

Beyond the basic procedure, other elements may be added to further increase accuracy of self-monitoring: accuracy checks, training, compliance with recording procedures, and reinforcement (Korotitsch & Nelson-Gray, 1999; Mahoney & Thoresen, 1974). To check accuracy, an independent observer must collect data simultaneously with the individual self-monitoring. As this is time prohibitive and observation of certain behaviors may be difficult, other methods are often used to increase accuracy. Additional methods to increase accuracy include training participants on the self-monitoring strategy using a model-prompt-check form of
instruction and monitoring compliance with the trained method of monitoring. Finally, provision of reinforcement contingent on accurate collection of data also increases levels of accuracy.

**Procedures for Recording.** Self-monitored data is collected either directly or indirectly (Mace & Kratochwill, 1988). While direct data collection involving the recording of a behavior as it occurs is thought to produce more reactive affects (Nelson & Hayes, 1981), the act of monitoring may interfere with the primary task (i.e., teaching, listening to instructions) and an indirect method may be more practical. Though some forms of observation are more common with self-monitoring procedures, most recording procedures used by outside observers are feasible when observing oneself.

Table A1

<table>
<thead>
<tr>
<th><strong>Self-Monitoring Recording Procedures</strong></th>
<th><strong>Example</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrations</td>
<td>ABC Format - A written description of the antecedent, behavior, and consequences</td>
</tr>
<tr>
<td>Frequency</td>
<td>Records of each occurrence of a behavior either continuously or for a set amount of time</td>
</tr>
<tr>
<td>Duration</td>
<td>Use of a timer or clock to measure the length of time engaged in a behavior</td>
</tr>
<tr>
<td>Time Sampling</td>
<td>Includes dichotomous coding, ordinal scale, randomized interval recording, momentary time sampling to identify the occurrence of a behavior during an identified time frame</td>
</tr>
<tr>
<td>Self-Rating</td>
<td>A rating is assigned based on comparison to a criterion</td>
</tr>
<tr>
<td>Behavioral Traces and Archival Records</td>
<td>Permanent products resulting from engaging in or avoiding a behavior</td>
</tr>
</tbody>
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*Note.* Table adapted from Mace & Kratochwill (1988)
Graphing and Goal-Setting

Graphing is an effective method to replace or co-exist with self-recording. By organizing data for formative evaluation, graphing provides a visual description of performance facilitating communication of student achievements (Tawney & Gast, 1984). Established as an important component of data-based instruction, visual displays of data are easily comprehended by students and teachers (Cohen & Spruill, 1990). Often used to assist with data analysis, graphs are more easily understood than verbal accounts of information (Mace & Kratochwill, 1988). Graphic display of data as a form of feedback also relates to increases in student achievement (Fuchs & Fuchs, 1987). In a 1986 review, Fuchs and Fuchs determined that students’ achievement improved when teachers graphed data rather than simply recording the information. Additional clarity provided by graphing likely aided teachers’ analysis of student data and by extension improved instructional decisions. As graphed data is more easily analyzed, it is logical to graph data during interventions to allow for interpretation of results. Visual displays of graphed data will likely reveal behavior changes that would otherwise go unnoticed. This feedback could provide reinforcement for the performance of the behavior, increasing the likelihood of the behavior occurring in the future.

Another intervention that promotes behavior change is goal setting. A goal represents attainment of a level of proficiency. Behaviors leading to goal achievement are reinforced when progress toward the goal is apparent. Comparisons with prior performance of the behavior prompt the participant to set and achieve stringent goals (Harkins & Lowe, 2000). Specifically, goals serve four primary functions: (a) focus attention on a behavior, (b) produces higher levels of effort, (c) encourage persistence, and (d) encourage the use of strategies (Locke & Latham, 2002). Changes in behavior are most often achieved when the person setting the goal has
experience with the behavior of focus. Adequate experience (i.e., equal time spent performing
the behavior before and after the goal is set) provides a reference point by which participants can
make comparisons and identify an appropriate goal (Locke & Latham, 2002).

Beyond experience with the behavior, feedback also enhances the effects of goal setting. Locke and Lantham (1990) promoted feedback and goal setting as a method to increase
performance. This combination was supported by a meta-analysis of studies implementing
feedback and goal setting to increase a wide range of behaviors (i.e., completion of arithmetic
problems, paragraph construction, physical exertion, industrial safety and cost performance)
(Neubert, 1998). Overall, the meta-analysis provided greater confidence in the superiority of the
combination of feedback and goal setting over goal-setting alone (Neubert). Feedback can be
generated from an external (e.g., researcher) or internal source (e.g., data collected by the
participant) (Neubert). In conjunction with goal setting, feedback is effective because it makes
accuracy and progress apparent to the participant while encouraging evaluation of performance
(Locke & Latham, 2002). As participants evaluate progress, they are able to evaluate previous
strategies or behaviors as effective or ineffective. With this additional information, participants
can make more rapid progress toward their goals and therefore gain reinforcement for their
behaviors more frequently (Neubert; Schunk, 2008).

**Teachers’ Use of Self-Monitoring**

Self-monitoring procedures including teacher observation of a pre-identified behavior
and a method of recording that behavior were identified in 14 studies published over the past
four decades. Nine studies (Allinder & Beckbest, 1995; Allinder, Bolling, Oats, & Gagnon,
2000; Belfiore & Browder, 1992; Browder, Liberty, Heller & D’Huyvetters, 1986; Hoover &
Carroll, 1987; Kalis, Vannest, & Parker, 2007; Nelson, Hay, Hay, & Carstens, 1977; Roskos,
Boehlen, & Walker, 2000; Workman, Watson, & Helton, 1982) used self-monitoring, four studies (Anderson & Freiberg, 1995; Keller, Brady, & Taylor, 2005; Sutherland & Wehby, 2001; Szykula & Hector, 1978) combined self-monitoring and goal setting, and one study (Griffin & Kilgore, 1995) combined self-monitoring and consultation. Duration of the studies varied from 15 to 200 days with a mean length of 60 days. Frequency of monitoring targeted behaviors by teachers varied from daily to bi-weekly, with half of the studies utilizing daily monitoring of behavior.

**Participants and Settings.** Beyond the role of teacher, few common characteristics were found among the 132 participants. Of the studies reporting gender, 87% of the 55 participants were female with experience ranging from 0 to 16 years. Teachers of students with disabilities were the focus of 8 of the 14 studies. Classroom settings included private pre-schools and adult programs, as well as, public elementary, middle, and high schools. A common link among the studies was the focus on teaching practices regardless of the setting or teacher characteristics. Each reviewed study focused on one aspect of teacher behavior. Six studies investigated effects of self-monitoring on behavior management, four focused on assessment, and four studies focused on instructional behaviors.

**Behavior Management.** Six studies (Kalis et al., 2007; Keller et al., 2005; Nelson et al., 1977; Sutherland & Wehby, 2001; Szykula & Hector, 1978; Workman et al., 1982) spanning 30 years of research focused on behavior management across a variety of educational settings from general education pre-school to self-contained special education high school. The six studies focused on use of teacher praise to manage student behavior and represented 43% of all studies implementing self-monitoring procedures. All studies focused on increases or decreases in praise related to teacher’s monitoring of their praise or reprimand statements using a variety of
monitoring methods. The majority of studies (Nelson et al.; Sutherland & Wehby; Szykula & Hector; Workman et al.) also reported the impact of the teachers’ use of self-monitoring procedures on students.

Self-monitoring of behavior management began with the researchers defining and providing training on the use of praise. By analyzing the data collected by teachers during the self-monitoring procedures, researchers were able to identify levels of effective praise and associate the type of praise with student behaviors. Common features of the studies with high rates of praise (Kalis et al., 2007; Szykula & Hector, 1978) were the provision of training focused on effective praise and the use of immediate recording to document praise. Increases in students’ sustained work (Workman et al., 1982) and correct responses (Sutherland & Wehby, 2001) also resulted from teachers’ implementation of self-monitoring.

**Assessment.** Four studies (Allinder & Beckbest, 1995; Allinder, Bolling, Oats, & Gagnon, 2000; Belfiore & Browder, 1992; Browder, Liberty, Heller & D’Huyvetters, 1986) examined effects of self-monitoring on teacher assessment practices. Self-monitoring of assessment practices enabled researchers to investigate teachers’ data-based decision making processes, and the influence of decisions on student achievement. The Browder studies (1986; 1992) focused on accurate interpretation of graphed data while the Allinder studies (1995; 2000) incorporated a software program to improve accuracy and focused on the types of decisions made by teachers based on the data. Student outcome data were monitored in all self-monitoring assessment studies.

Studies that utilized self-monitoring of assessment skills focused exclusively on the interpretation and use of assessment data to make instructional decisions. Self-monitoring procedures were characterized by extensive training on use of an assessment procedure and
monitoring of decisions based on researcher provided guidelines (Allinder & Beckbest, 1995; Allinder et al., 2000; Belfiore & Browder, 1992; Browder et al., 1986). Results suggest increases in teachers’ use of the trained decision making behavior and positive results for the majority of students when teachers self-monitored their decisions.

**Instruction.** Four studies (Anderson & Freiberg, 1995; Griffin & Kilgore, 1995; Hoover & Carroll, 1987; Roskos, Boehlen, & Walker, 2000) focused on instruction and included teacher use of checklists to self-monitor specific presentation behaviors. Within each study, specific instructional skills were included on checklists or questionnaires unique to the study. Each study included training to introduce teachers to the self-monitoring procedure and evaluated the teachers’ self-monitoring based on observed changes in instructional behaviors.

Self-monitoring procedures focused on instructional behavior were the most complex of all three areas. To monitor instruction, participants completed questionnaires or checklists and in one instance, transcribed classroom conversations (Roskos et al., 2000). These methods of recording contained items that were often subjective. Moreover, data collected in the self-monitoring procedures were often collected well after the lesson and solely based on teacher memory. Instead of helping teachers identify and change behaviors proficiently, the more complex monitoring tools produced inconsistent changes in behavior.

**Potential Uses of Self-Monitoring**

Generally used as a method to bridge the gap between a behavior and long-term consequences, self-monitoring provides a means to increase the probability of the occurrence of a behavior and to promote generalization of that same behavior to other settings. The 14 studies reviewed provided insight regarding the effects of self-monitoring procedures on teacher behaviors in the skill areas of behavior management, assessment, and instruction. Overall, the
studies suggest that self-monitoring has a positive impact on teaching practices, as well as concomitant positive effects on their students. A closer inspection of the components of various self-monitoring procedures used across skill areas demonstrated differential effects, indicating that not all components of self-monitoring packages are equally beneficial.

**Self-monitoring to promote instructional behaviors.** Self-monitoring procedures associated with increases in effective teaching practices shared several common components, which included explicit training and immediate recording of behaviors. For example, increases in the use of a behavior management strategy (i.e., praise rates) resulted from self-monitoring procedures that included training on specific praise and required teachers to record their use of praise immediately following observation of the behavior in the classroom or on audiotape. Similarly, self-monitoring procedures associated with increases in teachers’ assessment skills (i.e., data-based decisions) included training on the use of CBM and immediate recording of decisions following the examination of the assessment data. Both of these areas share a very well defined skill set that can be learned and objectively monitored concurrent with the occurrence of the behavior.

The skill area where the weakest effects for self-monitoring were found was that of effective instructional practices, which have the potential to affect the greatest change in students. Self-monitoring procedures used to record instructional skills included training that offered vague descriptions of teaching behaviors (e.g., introduce vocabulary, discourage call-outs) and removed the act of recording to hours or days following the behavior by asking teachers to record data based on memory or transcribed lessons. Lack of objective behavioral definitions for target behaviors and delayed nature of self-monitoring of performance differed widely from procedures used for both behavior management and assessment, where self-
monitoring was implemented effectively. By establishing key attributes of effective self-monitoring procedures, it may be possible to employ such procedures to improve and extend instructional teaching skills.

**Self-monitoring to promote generalization.** Self-monitoring procedures have increased the occurrence of teaching behaviors, but have only been associated with generalization of the behavior in one study. Keller and colleagues (2005) reported 2 of 3 participants were able to generalize behavior management skills to other settings. As demonstrated by the Keller et al. study, generalization is not always observed once a behavior is learned (Stokes & Baer, 1977). In a 2008 review, Scheeler identified four factors associated with successful generalization of teaching behaviors: (a) mastery of teaching skill, (b) use of immediate feedback during training, (c) training in generalization techniques, and (d) feedback in the classroom setting. By following Sheeler’s (2008) framework for promoting generalization, it is possible that self-monitoring procedures may be an effective way to promote generalization without utilizing costly or time limited outside observers. By completing training sessions including the use of feedback, participants will become proficient with both the behavior and the self-monitoring procedure. Further, the self-monitoring procedure will promote generalization by utilizing stimuli common to both training and the classroom setting (i.e. hand-counter). Finally, the data collected by self-monitoring will provide participants with a form of feedback.

**Mastery of Teaching Skills.** Mastery of teaching skills is closely connected to the training components of self-monitoring procedures. As teachers are unable to monitor a skill of which they are not knowledgeable, training and mastery are critical to make the targeted behavior salient. When applied to self-monitoring procedures, the idea of mastery is of utmost
importance as the teacher is responsible for monitoring his or her correct implementation of the behavior. Examples of the need for mastery are evident across the teaching skill areas.

Training components were evident in the majority of studies addressing the teaching skills involved with behavior management and assessment. Studies that utilized training components did so using well-defined behaviors that were rehearsed until mastery. For example, teachers were taught to differentiate between types of praise (e.g., specific vs. general) (Kalis et al., 2007; Keller et al., 2005) and given information about the connection between praise and on-task student behavior (Workman et al., 1982). Training was also integral to the success of the studies focused on assessment skills (Allinder & Beckbest, 1995; Allinder et al., 2000; Belfiore & Browder, 1992; Browder et al., 1986). Teachers were trained to analyze the data and select a decision based on their analysis. Without training, the assessment rules would have been abstract concepts instead of valuable tools that influence behavior. Clearly training to mastery is necessary to adequately self-observe and engage in targeted teaching skills.

Acquisition of Feedback. In conjunction with training, it is also essential to provide feedback to ensure teachers are mastering the concepts being presented. The need for feedback during training was possibly most evident in one of the studies focused on self-monitoring of instruction. Roskos, Boehlen, and Walker (2000) did not provide feedback while training teachers on the preferred classroom conversation strategies. Researchers identified classroom conversations focused on academic concepts rather than social functions to be more desirable. This classification of the types of conversation was not presented during training, and instead training focused mainly on the checklist used to collect the data. Beyond a whole group discussion about effective instructional conversations, no responses were elicited or feedback given during the training session. Teachers were not corrected when they identified social
functions of conversation as more desirable. Consequently, teachers were unable to accurately record conceptual and social elements of instructional conversations while using the self-monitoring checklist in their classrooms. The limited accuracy that resulted appears to be linked to the lack of feedback provided during training. The need for explicit feedback is further emphasized by a slight increase of the social elements of instructional talk, which were the non-preferred elements. As indicated by this study, a training session is not adequate unless feedback is provided as teachers acquire the new skills.

**Training in Generalization Techniques.** Training in generalization techniques can take many forms, but the form most closely aligned with the reviewed self-monitoring procedures involves the programming of common stimuli (Scheeler, 2008). Intrinsic to a self-monitoring procedure is the use of a recording tool (e.g., paper and pencil, handcounter, audio recorder). When used in training, the recording tool is used to practice recording the desired behavior. Once the teacher is in the classroom, the recording tool also serves as a stimulus to facilitate the performance of the practiced skill.

This relationship is apparent in the reviewed self-monitoring procedures involving immediate recording of praise (Kalis et al., 2007; Nelson et al., 1977; Szykula & Hector, 1978) and recording of assessment decisions (Allinder & Beckbest, 1995; Allinder et al., 2000; Belfiore & Browder, 1992; Browder et al., 1986). Immediate recording facilitated by a recording tool corresponded with increases in teaching behaviors. Conversely, a lack of a recording tool to emphasize generalization was evident in the study conducted by Griffin and Kilgore (1995) comparing the effects of consultation with consultation plus self-monitoring. Participants in the study did not see the recording tool (i.e., questionnaire) until they were consulting with their
university supervisors. Without the questionnaire in the classroom, participants may have overlooked the instructional skills emphasized.

**Immediate Feedback in the Classroom Setting.** Feedback must be immediate and within the natural classroom setting. For a self-monitoring procedure, this would mean behavior should be recorded in the natural context and analyzed by the teacher. Much like when a college supervisor gives feedback onsite, self-monitoring provides a benchmark (i.e., baseline) and relies on reactivity of observation to change behavior (Mace & West, 1986; Nelson & Hayes, 1981). The supervisor, or self-monitoring device, becomes a discriminative stimulus for targeted teaching behaviors.

Immediate feedback in natural settings is evident in self-monitoring procedures when behavior is recorded directly following observation. This act makes behavior more salient by transferring it to a tangible, recorded format. Benefits of immediate feedback are possible for each of the teaching skills, but were found most often in self-monitoring procedures focused on behavior management and assessment.

Immediate feedback was apparent in effective studies focused on praise as a behavior management skill. Researchers (Kalis et al., 2007; Szykula & Hector, 1978) demonstrated the use of immediate recording of data (e.g., hand counter or tally marks) corresponded with increases in teachers’ use of positive praise statements. Similarly, all studies focused on self-monitoring of assessment skills reported increases in teachers’ data-based decision making. Increases corresponded with a recording procedure that directly followed analysis of graphed data.

In studies that examined the effects of checklists as a self-monitoring device, there was often a delay in recording as teachers evaluated their behavior by memory (Anderson &
Freiberg, 1995; Griffin & Kilgore, 1995) or through a transcribed lesson (Roskos et al., 2000).

These delays were often lengthy (e.g., end of the school day, during supervisor’s visit) and were completely removed from the behaviors that occurred during instruction. While reflection can be a key aspect of improving teaching (Jones & McNamara, 2004; Sherin, 2004), the process used during reflection may be quite different from that used for self-monitoring. By reviewing the lesson from memory, teachers may forget key elements or misjudge the number of occurrences of a behavior. When observation is limited to the memory of a behavior, it is unlikely that recording will increase the occurrence of the original behavior. Self-monitoring procedures implemented to increase use of instructional behaviors have not been consistently effective.

Outcomes in each study were adversely affected by poorly defined behaviors, delayed recording of the behavior, and a lack of feedback during training and self-monitoring. Self-monitoring has the potential to increase teacher use of effective instructional behaviors, but the procedures used must be modified to insure more consistent positive outcomes.

**Conclusion**

The primary goal of this review was to identify a method to increase teacher use of effective instructional practices. In an effort to achieve this goal, a measureable, effective instructional behavior (i.e., learning trials) and a method to increase behavior (i.e., self-monitoring) were identified. The behavior and method appear complimentary, as learning trials are defined by three observable components, and self-monitoring is most effective at increasing specific, observable behaviors. In previous studies (Albers & Greer, 1991; Scheeler, Bruno, Grubb, & Seavey, 2009; Scheeler & Lee, 2002), learning trial completion was monitored by outside observers, therefore limiting the amount of instruction that was monitored. Previous self-monitoring studies focused on instruction (Anderson & Freiberg, 1995; Griffin & Kilgore, 1995;
Hoover & Carroll, 1987; Roskos, Boehlen, & Walker, 2000) reported inconsistent behavior change because the focus was on behaviors that were not clearly defined, not prompted during the lesson, and recorded based on memory.

Based on what was learned from previous studies, a new approach was necessary to both monitor more instruction and monitor instruction more effectively. An increase in effective instructional practices by using self-monitoring procedures is possible if the following guidelines are followed: (a) selection of a clearly defined behavior (i.e. learning trials), (b) immediate recording of each occurrence of a behavior, and (c) recording of behavior with a conspicuous device (i.e. hand-counter). Beyond the self-monitoring procedures itself, other components (i.e. graphing and goal setting) will be added to potentially increase the effectiveness of the self-monitoring procedure. Previous studies (Anderson & Freiberg, 1995; Keller, Brady, & Taylor, 2005; Sutherland & Wehby, 2001; Szykula & Hector, 1978) implemented self-monitoring procedures simultaneously with graphing and goal setting making it impossible to determine whether the additional components increased the effectiveness of self-monitoring. This study attempts to systematically implement all of the components linked to successful self-monitoring procedures to identify the effectiveness of each. Beyond effectiveness, information on participants’ perceptions of the intervention strategy will be collected and reviewed. Finally, data will be collected from an additional content area to identify if self-monitoring procedures do successfully promote generalization. Self-monitoring procedures are a promising method to improve teacher effectiveness. Such procedures enable teachers to analyze and modify their behavior efficiently and in a manner which is easily transferred to other content areas or settings (Szykula & Hector, 1978). With such benefits, the
process of self-monitoring is a likely solution to increase teachers’ use of effective instructional behaviors and generalization of trained skills.
Appendix B

Participant Informed Consent Form

Informed Consent Form for Social Science Research  (PSU IRB#34947)
The Pennsylvania State University

Title: Teacher Self-Monitoring of Instructional Behaviors

Principal Investigator: Brooke J. Lylo, M Ed.
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bje141@psu.edu

Advisor: David L. Lee, Ph.D., BCBA-D
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814-865-7066 (fax)
davidlee@psu.edu

Dear Potential Study Participant:

Your voluntary participation is requested for a study entitled Teacher Self-Monitoring of Instructional Behaviors. This study involves research which is intended to identify the effect self-monitoring has on teachers’ use of three term contingency trials during instruction. Three term contingency trials are interactions between teachers and students which include a question from the teacher, a response from the student, and feedback from the teacher.
During the study you will proceed through a series of self-monitoring procedures. Self-monitoring involves observing and recording your own behaviors. You will be asked to audiotape lessons and record your use of three term contingency trials using a hand counter. The entire lesson will be audio taped, but you will only be responsible for monitoring your behavior during the review portion of the lesson.

By participating in this study, you will be asked to participate in two half-hour training sessions. Beyond this time commitment, you will need to allocate time to start and stop the recording device and be willing to utilize the hand counter while conducting your lesson. The approximate duration of the study will range from 5 to 16 weeks.

Your participation in this research is confidential. The data, including audio-recordings, will be stored and secured in 123 CEDAR building on the campus of The Pennsylvania State University in a locked file. Only the researchers will have access to the data. In the event of any publication or presentation resulting from this research, no personally identifiable information will be disclosed. Five years from the completion of this study, the data including audio recordings will be destroyed.

Please contact Brooke Lylo at (570) 394-0943 with questions, complaints or concerns about the research.

Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawing from this study will involve no penalty or loss of benefits you would receive otherwise.

You must be 18 years of age or older to take part in this research study. If you agree to take part in this research study and the information outlined above, please sign your name and indicate the date below.

You will be given a copy of this consent form for your records.

______________________________________________  ______________________
Participant Signature   Date

______________________________________________  ______________________
Person Obtaining Consent   Date
Appendix C

Data Analysis Forms

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<th>Participant</th>
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**SIDE A – Baseline**

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**SIDE B – Generalization**

<table>
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<th>Lesson Title &amp; Participant Notes</th>
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<tr>
<th><strong>Learning Trials</strong></th>
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<td>Teacher Prompt</td>
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<td>Student Response</td>
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<td>Teacher Feedback</td>
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Length of Review (Participant) _______ seconds

Length of Review (Researcher) _______ seconds

Completed Learning Trials __________

Percentage of Completed Learning Trials _______

\[ \left( \frac{\text{Total # of completed learning trials}}{\text{Total # of teacher prompts}} \right) \times 100 \]

Rate of Learning Trial Use (Researcher) _______

\[ \left( \frac{\text{Completed Learning Trials}}{\text{Length of Review}} \right) \times 60 \]
## SIDE A - Phase 2

**Lesson Title & Participant Notes**

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<th>Student Response</th>
<th>Teacher Feedback</th>
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**Learning Trials**

- Length of Review (Participant) ________ seconds
- Length of Review (Researcher) ________ seconds
- Completed Learning Trials (Participant) ________
- Completed Learning Trials (Researcher) ________
- Percentage of Completed Learning Trials ________
  \[
  \frac{\text{Total # of completed learning trials}}{\text{Total # of teacher prompts}} \times 100
  \]
- Rate of Learning Trial Use (Participant) ________
  \[
  \frac{\text{Completed Learning Trials}}{\text{Length of Review}} \times 60
  \]
- Rate of Learning Trial Use (Researcher) ________
  \[
  \frac{\text{Completed Learning Trials}}{\text{Length of Review}} \times 60
  \]

## SIDE B - Generalization

**Lesson Title & Participant Notes**

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<th>Teacher Prompt</th>
<th>Student Response</th>
<th>Teacher Feedback</th>
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**Learning Trials**

- Length of Review (Researcher) ________ seconds
- Completed Learning Trials ________
- Percentage of Completed Learning Trials ________
  \[
  \frac{\text{Total # of completed learning trials}}{\text{Total # of teacher prompts}} \times 100
  \]
- Rate of Learning Trial Use ________
  \[
  \frac{\text{Completed Learning Trials}}{\text{Length of Review}} \times 60
  \]
Appendix D

Introductory Training

I. Opening

a. State the Goal of the training: Teachers will be able to identify six teaching functions and components of a review of prerequisite skills.

b. Review the six teaching functions asking participants to provide descriptions for each component (Each participant will receive a handout with the six teaching functions printed on it)

   i. Review
      - Review homework and relevant previous learning
      - Review prerequisite skills and knowledge

   ii. Presentation
      - State lesson goals
      - Present new material in small steps
      - Model procedures
      - Provide examples and non-examples
      - Use clear language
      - Avoid digressions

   iii. Guided Practice
      - Require high frequency of responses
      - Ensure high rates of success
      - Provide timely feedback, clues, and prompts
      - Have students continue practice until they are fluent

   iv. Corrections and feedback
      - Specific feedback to student responses
      - Re-teach when necessary

   v. Independent practice
      - Monitor initial practice attempts
      - Have students continue practice until skills are automatic

   vi. Weekly and monthly reviews
II. Review of Prerequisite Skills

a. Define “Review of Prerequisite Skills” – the appraisal of student knowledge of previously taught skills related to the lesson objective occurring at the beginning of a lesson.

b. Importance of the Review – allows teachers to confirm student mastery of prerequisite skills before proceeding with new content

c. Include participants in the planning of review sections for several model lessons

   i. You are teaching a lesson on the topic of words with the “at” sound

      1. What skills would you review? (example responses: “a” and “t” sound; the word “at”; word families already studied)

      2. What prompts would you use to begin learning trials? (What is the sound for short “a”? Everyone.; Last week, we talked about the “an” word family, let’s review how to form words by adding a consonant. Hold up an index card with the word “an” printed on it. Place an index card with a consonant written on it in front of it and ask each individual student to read words as different consonant cards are placed in front of the “an” card.

   ii. You are teaching a lesson on the 3’s multiplication facts

      1. What skills would you review? (example responses: adding, subtracting, previously learned multiplication facts)

      2. What prompts would you use to begin learning trials? (What does 2 x 2 equal?; What does 3 + 4 equal?)
III. Audio Recorders

a. Give each participant an audio recorder
b. Demonstrate how to operate the recorders
c. Allow participants to practice recording their own voice and creating at least two audio files

IV. Research Expectations

a. Inform participants that we are beginning the first stage of data collection. This phase requires the following actions:
   i. Participants will audio record a primary content area they select every time they conduct a lesson. This recording will be on Side A of the microcassette.
   ii. Participants will audio record a secondary content area they select every time they conduct a lesson. This recording will be on Side B of the microcassette.

b. Inform participants that the researcher will collect microcassettes at the school every other day.

c. Provide each participant with a large envelope containing the recorder and an information sheet with directions.

d. Provide each participant with copies of the parent information letter to send home with student PRIOR to recording
SIX TEACHING FUNCTIONS
Rosenshine & Stevens, 1986
Archer & Hughes 2011

1. Review
   - Review homework and relevant previous learning
   - Review prerequisite skills and knowledge

2. Presentation
   - State lesson goals
   - Present new material in small steps
   - Model procedures
   - Provide examples and non-examples
   - Use clear language
   - Avoid digressions

3. Guided Practice
   - Require high frequency of responses
   - Ensure high rates of success
   - Provide timely feedback, clues, and prompts
   - Have students continue practice until they are fluent

4. Corrections and feedback
   - Specific feedback to student responses
   - Re-teach when necessary

5. Independent practice
   - Monitor initial practice attempts
   - Have students continue practice until skills are automatic

6. Weekly and monthly reviews
RECORDING INSTRUCTIONS

- Before you begin recording, send home the parent letter with students and identify the audio recorder for the students at the beginning of the lesson.

- Record the data collection lesson and __________ lesson EVERY time you teach (you DO NOT have to record supervised lessons if you feel it will interfere with the evaluation).

DATA COLLECTION LESSONS

- Audio Recorder - Audio record the entire lesson on side A of the tape
- Timer - Time the review of pre-requisite skills by starting the timer when you say the first word of the review and stopping the timer when you say the last word
- Hand-counter - Press the button on the hand-counter ONCE immediately after you start the timer

_______________ LESSONS

- Audio Recorder - Audio record the entire lesson on side B of the tape

- AFTER recording both lessons, write the date on an envelope, put the tape inside the envelope, and seal the envelope.

If you have questions or concerns, please contact Brooke Lylo at (570) 394-0943 or at brooke.lylo@gmail.com
Appendix E

Parent Letter

February 11, 2011

Dear Parent or Guardian,

My name is Brooke Lylo, and I am a doctoral student at Penn State. As part of my program, I am studying how teachers can best implement evidence-based teaching strategies. Your child’s student teacher is currently participating in my research study affiliated with The Pennsylvania State University. The focus of the study is on increasing the use of effective instructional skills in classrooms. To identify the use of instructional skills, portions of lessons conducted by the student teacher will be audio taped. Your child will NOT be a participant, and your child’s identity will be unknown to the researchers. However, when answering questions during part of class your child’s voice may be captured on audiotape. If you have further questions or concerns, please contact me.

Sincerely,

Brooke J. Lylo, M. Ed.
Doctoral Candidate in Special Education
The Pennsylvania State University
123 CEDAR Building
University Park, PA 16802
bje141@psu.edu
570.394.0943
Appendix F

Self-Monitoring Training

I. Introduce self-monitoring as a method to collect data on one's own behaviors

II. Review Learning Trials (see attached handout)

III. Explain self-monitoring of Learning Trials
   a. Record only a complete learning trial
   b. The three steps count as ONE learning trial
   c. Press the hand-counter each time a learning trial is completed (during or after teacher feedback)

IV. Practice using the hand-counter
   a. Play a baseline audio recording and ask the participant to record the number of learning trials using the hand counter
   b. Compare the participants results to the number recorded by the researcher
   c. Continue practicing until 100% agreement is reached

V. Instruct participant to begin monitoring use of learning trials during the review of prerequisite skills.
   a. Ask the participant to ONLY self-monitor during the lessons written by the participant, but to continue recording both lessons from baseline.
   b. Ask participants to copy the number from the hand-counter onto an index card each day and place the index card into a sealed and dated envelope (index cards and envelopes will be provided by the researcher).
Learning Trials

(Three Term Contingency Trials)

(Albers & Greer, 1991)

- A “Learning Trial” is the smallest unit of instruction in which learning occurs. It includes an antecedent, behavior, and consequence.
  - Antecedent – a clear question from the teacher addressed to either the entire group or individual students
  - Behavior – student response – verbal, written, or physical
  - Consequence – a specific feedback from the teacher clearly identifying whether the student response was correct or incorrect

- A significant positive correlation exists between the use of three term contingency trials and student’s correct responses.

<table>
<thead>
<tr>
<th>Learning Trials</th>
<th>Non-examples</th>
</tr>
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</table>
| Teacher: “What’s 10 x 10?”  
Student: “100”  
Teacher: “Excellent” | Teacher: “What’s 10 x 10?”  
Student: “100”  
Teacher: No response |
| Teacher: “What’s the square root of 81?”  
Student: “8”  
Teacher: “No, the square root of 81 is 9.”  
(repeat the learning trial) | Teacher: “What’s the square root of 81?”  
Student: “8”  
Teacher: “Does anyone know the answer?” |
| Teacher: Write the sentence “I like cats.” with proper punctuation.  
Student: Writes “I like cats.”  
Teacher: “Good, you capitalized the “I” and put a period at the end. | Teacher: Write the sentence “I like cats.” with proper punctuation.  
Student: Writes “I like cats.”  
Teacher: Does not look at the paper, continues with the lesson |

Note. Table adapted from Albers & Greer, 1991
Self-monitoring Directions

1. Continue audio recording both your data collection lesson and content area lesson. Record the data collection lesson on side A of the microcassette and the content area lesson on side B.

2. During your data collection lesson only, use the hand-counter to record completed learning trials during the review of prerequisite skills.

3. Copy the recorded number from the hand counter onto one of the provided data cards.

4. At the end of the day, place the microcassette with the recorded lessons AND the data card in the dated envelope provided.

If you have questions or concerns, please contact Brooke Lylo at (570) 394-0943 or at brooke.lylo@gmail.com.
Appendix G

Graphing and Goal Setting Training

I. State that the graph will enable the participant to visually track the data they are monitoring

II. Demonstrate how to complete the graph
   a. Record the date and time of GRAPHING
   b. Identify a rate from the self-monitored data and position it on the graph

III. Graphing practice
   a. Have the participant graph their rates from the self-monitoring phase (must include time of graphing, date of graphing, and correct position)
   b. Continue practicing until 100% accuracy is achieved

IV. Introduce the concept of setting goals to make changes in behavior
   a. The goal should be based on prior performance
   b. The goal should be rigorous but achievable
      i. Provide CEC guidelines for opportunities to respond (4-6 opportunities per minute for new content; 8-12 opportunities per minute for independent level content)
   c. Model setting a goal based on contrived data

V. Participant sets a goal
   a. Ask the participant to look over the data points on the graph from the self-monitoring phase
   b. Ask the participant to develop and write a goal on the top line of the provided graph
VI. Instructions

a. Ask participants to continue audio recording and self-monitoring as in the previous phase

b. Ask participants to graph the rate of completed learning trials they monitor on the graph provided (see attached)
Learning Trial Graph

Name _______________________________________        Content Area __________________________________________

First, enter the date of the lesson and the date and time of graphing on the horizontal axis. Second, plot the rate of Learning Trials recorded during each lesson.

Goal: _________________________________________________________________________________________________

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Date and Time of Graphing
Appendix H

Self-Monitoring Questionnaire

Please complete the following questions regarding the self-monitoring procedure you implemented.

Do not include your name.

Use the back for additional writing space or to include additional comments.

1. Did you notice any changes in your behavior throughout the intervention? If so, what behaviors changed and at what point did you notice the change.

2. On the following scale, please rate how easy or difficult it was to use the hand counter to record data while teaching.

   Easy--------Somewhat Easy--------Neutral--------Somewhat Difficult--------Difficult

   1        2        3        4        5

   Please explain your rating.

3. Would you use a hand counter to record an instructional behavior in the future? If so, what behavior would you review?

4. Please provide suggestions for how this intervention can be improved for teacher use in the future.
Additional Comments:
Data Review Questionnaire

Please complete the following questions regarding the self-monitoring procedure you implemented.

Do not include your name.

Now that you have reviewed your data from the intervention, are you pleased with the results? Please explain.
VITA

BROOKE J. LYLO

Education

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<th>Degree</th>
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<td>MS</td>
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<td>Special Education</td>
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<td>BS</td>
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<td>Grove City College</td>
<td>Elementary/Early Childhood Education</td>
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Professional Experiences

2008-2011 The Pennsylvania State University, University Park, PA, Teaching Assistant & Field Experience Supervisor, Special Education

2007-2008 Bloomsburg University, Bloomsburg, PA, Instructor, Elementary/Early Childhood Education

2002-2007 Baltimore City Public Schools, Baltimore, MD, Teacher, Primary Special Education & General Education

Publications
