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Effects of Concurrent Self-Monitoring on Preservice Teachers' Instructional Practice

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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 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. Furthermore, use of the self-monitoring procedure received favorable ratings from all of the participants.

Key Words: self-monitoring, preservice teachers, teacher training, generalization, effective instruction

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(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.*

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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 in discriminable 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), Scheele 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).

1.1 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.

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 (2013) 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) Are self-monitoring methods socially valid in the context of pre-service student teaching?

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.

2.1 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 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. 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.

2.2 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) 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. Audio files were recorded using a hand-held 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. 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.).

2.3 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. 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. 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.

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. Give both the self-monitoring data card and audio recording to the primary researcher. 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.*"

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. The cards and corresponding audio recordings were periodically collected by the primary researcher.

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 to 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 of 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.

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.

2.4 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.

2.5 Inter observer 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 no examples 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.

Inter observer agreement data were collected for at least 30% of the sessions for each participant during baseline, intervention, and fading. Inter observer agreement was calculated by dividing the number of agreements by the sum of agreements and disagreements and multiplying the quotient by 100.

Mean inter observer 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 inter observer 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/goal setting intervention, mean inter observer agreement was 100% (range = 100%-100%) for Helen and 96.5% for Claire. Finally, inter observer agreement was calculated for Helen as she completed the fading session; agreement for the session was 100%.

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. Finally, social validity data are presented.

Table 1: Percentage of Completed Learning Trials

	Baseline		Self-Monitoring		Self-Monitoring + Graphing/Goal Setting		Fade	
Participants	*M*	Range	*M*	Range	*M*	Range	*M*	Range
Self-Monitoring Content Area								
Helen Reading	64.2	38-75	100	100-100	98	90-100	100	-
Claire Math	86.9	27-100	91.6	77-97	96	95-97	-	-
Michelle Writing	61.2	33-77	93.7	89-100	-	-	-	-

Table 2: Rate of Completed Learning Trial Delivery per Minute

	Baseline		Self-Monitoring		Self-Monitoring + Graphing/Goal Setting		Fade	
Participants	*M*	Range	*M*	Range	*M*	Range	*M*	Range
Self-Monitored Content Area								
Helen Reading	6.8	4.9-10.5	8.3	6.5-9.7	12.7	9-16.2	12	-
Claire Math	6	2.2-8.8	5.5	77-97	5	5.6-4.4	-	-
Michelle Writing	3.7	2.3-4.5	7.7	5.3-11.7	-	-	-	-

3.1 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. 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. 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. 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.

3.2 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.

3.3 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.

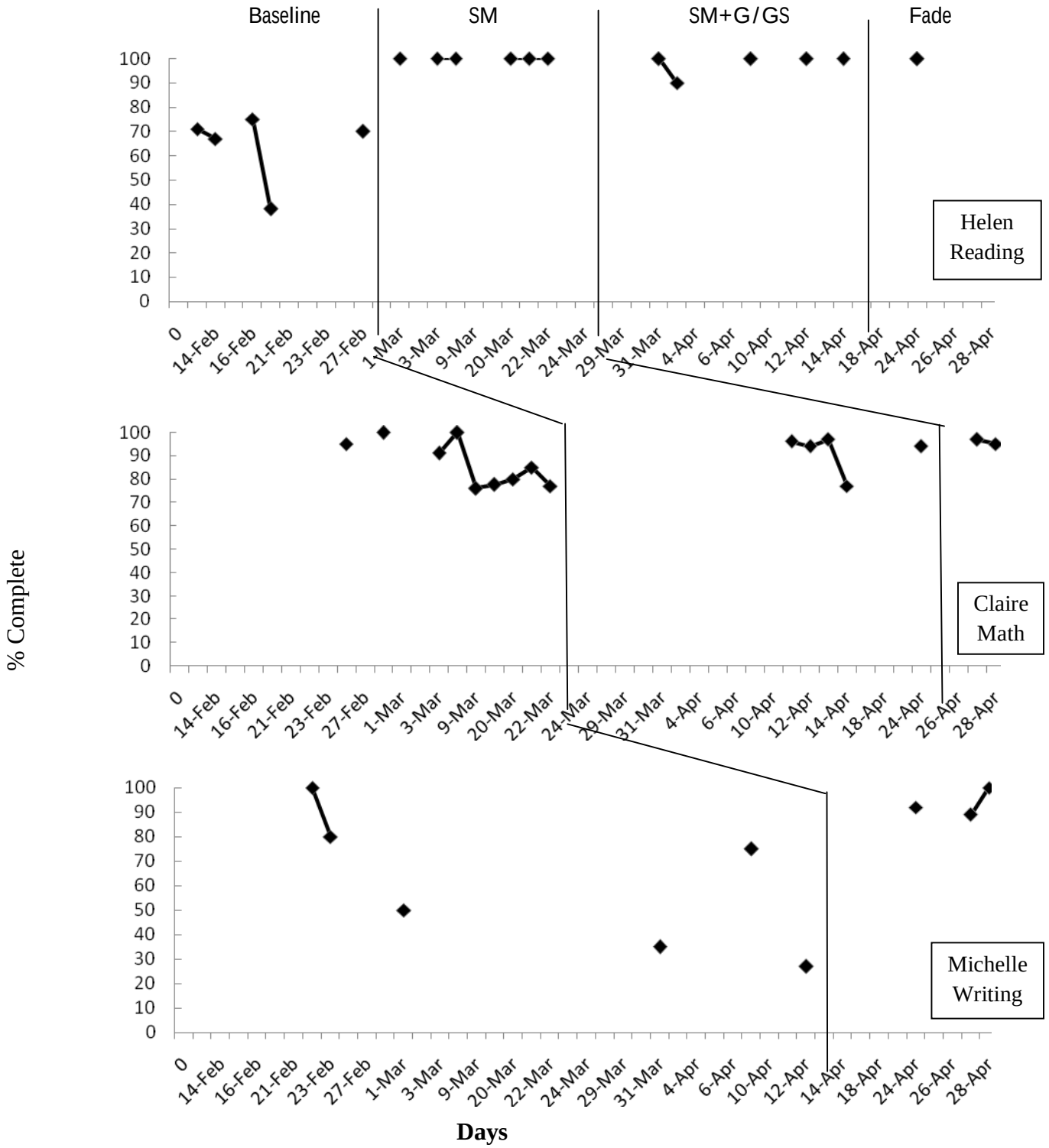

Figure 1. **Percentage of learning trials completed across phases. SM = self-monitoring phase. SM+ G/GS = self-monitoring plus graphing and goal setting phase. Participant name and content area taught are listed for each graph.**

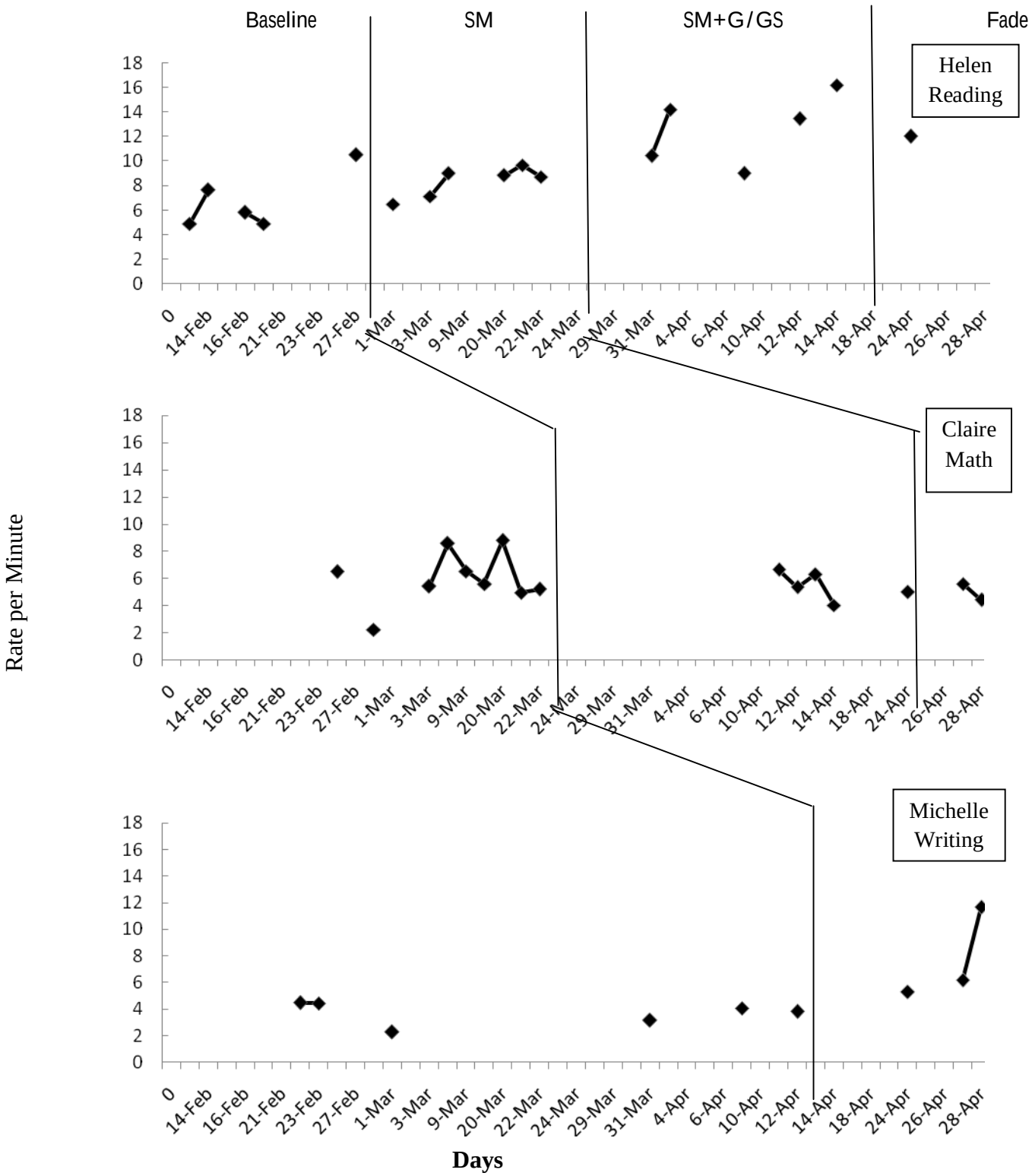

Figure 2. **Rate of learning trials completed per minute across phases. SM = self-monitoring phase. SM+ G/GS = self-monitoring plus graphing and goal setting phase. Participant name and content area taught are listed for each graph.**

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, 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.

4.1 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?

4.2 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.

4.3 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. 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.

4.4 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 sacrificed to some extent. 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.

4.5 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.

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