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A Comparison of Self-Monitoring of Attention and Self-Monitoring of Productivity in Relation to Academic Achievement and On-Task Behavior among Students receiving Special Education

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and Self-Monitoring of Productivity in Relation

to Academic Achievement and On-Task Behavior

among Students receiving Special Education

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A COMPARISON OF SELF-MONITORING OF ATTENTION AND SELF-MONITORING OF PRODUCTIVITY IN RELATION TO ACADEMIC ACHIEVEMENT AND ON-TASK BEHAVIOR AMONG STUDENTS RECEIVING SPECIAL EDUCATION

by

Kirk Michael Cervetti

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ABSTRACT

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Research has shown that self-monitoring of attention (SMA) and self-monitoring of productivity (SMP) are beneficial in increasing academic performance and on-task behavior. The simplicity and ease of self-monitoring renders it an applicable tool for students that have learning disabilities (LD). An alternating treatment design was used to examine four students receiving special education and that have LD during math instruction. Each student was trained to implement SMA and SMP during math class. This study was conducted in order to investigate the differences between SMA and SMP in relation to academic performance and on-task behaviors with students that having LD and that are receiving special education. Results did show a difference between the two techniques in which self-monitoring of productivity produced higher and more stable rates of academic performance and on-task behaviors. However, there was no increase in academic performance among the participants overall. The results show that there was no increase in target behaviors during treatment conditions over baseline conditions.

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CHAPTER 1

Introduction

Many students have problems with maintaining attention and focus to academic material, making it more difficult for them to learn than students without any disabilities (Vostal, Hughes, Ruhl, Benedek-Wood, & Dexter, 2008). These problems range from minor trouble in maintaining focus to task to substantial difficulties that interferes with their ability to finish school work. The teachers and the other students in the classroom could also experience setbacks due to the student disrupting the instruction. It is possible for the students to become discouraged due to not meeting academic demands and engage in inappropriate behavior. The teacher then has to spend time and resources on remediation of the students' behavior instead of academic instruction. Students that encounter these challenges can improve and adapt to meet classroom needs by self-managing their behavior. In addition, how the environment is structured is also one of the most important factors of learning for a student. The environment should include powerful and effective teachers, interesting and stimulating material, and a setting with minimal distractions (Cooper, Heron, & Heward, 2007).

In order to learn appropriately in the academic setting, or any setting suitable as a learning experience, the student first needs to focus on the material and to exert an appropriate amount of attention and energy towards it (Neisser, 1976). Yet, some students have not learned how to pay attention during class. These students differ in the acquired proficiencies and requisite skills of appropriately attending to target information. For these students, self-monitoring, a type of study skill, can be used to combat the challenge of learning (Reid, 1996).

Self-monitoring and reporting techniques have been shown to immediately increase academic performance (Gillat & Sulzer-Azaroff ,1994). The techniques have been shown to be valuable tools to induce self-management skills. Self-management skills are personal skills that entail systematically applied behavior change strategies that result in the desired change in one's own behavior (Hughes & Lloyd, 1993). Many studies have shown that self-monitoring promotes attention to task (e.g., Harris, 1986; Lloyd, Bateman, Landrum, & Hallahan, 1989; and Rooney, Polloway, & Hallahan, 1985). However, some authors suggests that the focus of research in self-monitoring should be concentrated on the academic performance rather than attending (Klein, 1979; Snider, 1987). They believe that self-monitoring of academic performance will provide greater benefit than the self-monitoring of on-task behaviors or other auxiliary monitoring. No matter which method is used to increase time on task and academic achievement it is important to make the process more efficient. If it is focusing on antecedents as predictors of academic progress, with self-monitoring of attention, or examining the consequences, the number of correct answers, the main purpose of self-monitoring is to increase the academic abilities. Self-monitoring is extremely useful and can be implemented to assist many students achieve better grades.

CHAPTER 2

Literature Review

Review of Literature

Attending, in the sense of gathering information from the environment, is a prerequisite skill for appropriate subsequent action; in the case of science, one of the main objectives is to achieve a thorough understanding of the phenomenon being studied. In applied behavior analysis (ABA), socially important behaviors are the phenomenon being studied. The only way behavior analysts can achieve understanding and effective treatment of socially important behaviors is to attempt to observe the occurrence or nonoccurrence of the behaviors and systematically record the conditions that produce or do not produce them. In essence, monitoring of the behavior is needed prior to and during the implementation of treatment to conclude the treatment's effectiveness. Even before observation can begin someone has to notice that the target behavior is in need of change.

It is necessary to rule out potential sources of control in order to validly infer that other variables are the sources of control for dependent variables (Aronson, Ellsworth, Carlsmith, & Gonzales, 1990). The experimenter is required to monitor what happens before, during, and after the environmental manipulation occurs. Another way of terming this could be experimenter-monitoring. On the other hand, self-monitoring is a procedure whereby a person observes his or her own behavior and systematically records the information in an attempt to understand what controls the target behavior. The antecedent variables are not commonly observed during self-monitoring for most applications. Rather, the occurrence or nonoccurrence of behavior is observed and recorded (Cooper,

et al., 2007). Self-monitoring is simply a shift of responsibility of the task of observation; it is an act of measurement.

Personal observation is a very logical practice since the person is continuously the witness of his or her behavior. Some form of self-monitoring is practiced everyday by almost everyone in all daily activities. Everything from remembering to put one's socks on in the morning, to setting the alarm clock at night, is a consequence of self-monitoring. This technology is learned by most of the people that appropriately function in society. Self-monitoring is a key element of self-management, it is the deliberate modification of subsequent variables in order to produce change in other conditions that ultimately serves as to achieve an end (Cooper, et al., 2007). For some, self-monitoring and self-management is not learned as easily and is not developed well enough to facilitate goal acquisitions. Epstein (1997) commented

> We manage our behaviors when we deliberately alter the variables of which that behavior is a function; that is, when we act in some way in order to change our subsequent behavior. Some people do this frequently and well, others do it rarely and poorly. (p 547)

Self-management is an on going task because one's own goals are constantly changing and world events are always adding or subtracting variables that influence one's behavior. It is important to teach individuals to self-monitor so that they can adequately self-manage and become independent of other's direction.

The following is an analysis of the research base that focuses on the active ingredients of self-monitoring. The literature seems to suggest that one important part of self-monitoring is setting a goal. By setting a goal the effectiveness of self-monitoring is significantly increased (Locke & Latham ,1990). The self-monitoring needs to draw the subjects' attention to their target behavior for reactivity to take place. This awareness of

behavior does not need to be perfect and highly accurate. As long as effort is put forth toward noticing one's behavior, dynamic modification can also take place.

Self-Monitoring and Goal Setting. Self-monitoring is often not effective without additional analysis. Collecting data will not be helpful unless it is used to understand some phenomena or ultimately solve problems. As such, self-monitoring of the target behaviors should be oriented to achieving set goals. The goals can be personally established but should require high effort. Locke and Latham (1990) claim that easy goals or goals that are not specified, like "try-your-best" goals, result in low performance. Self-generated goals that are difficult and specific result in more beneficial effects on performance. By setting specific goals one understands that there are certain criteria to be met, instead of having a goal that has no value, as in try-your-best goals which result in just an outcome. There are many studies that show the success of self-set goals in sports settings coupled with public postings (Brobst & Ward, 2002; Mellalieu, Hanton, & O'Brien, 2006; and Ward & Carnes, 2002), as well as academics (Gaa, 1979; Morgan, 1987; and Ridley, Schutz, Glanz, & Weinstein, 1992). For example Gaa (1979) conducted a study in which students met each week during treatment in order to set goals and evaluate progress of old goals and a group that did not meet to set goals. The results showed that students who set goals achieved higher levels of success than students that did not meet as a group to set goals. Kirby, Fowler, and Baer (1991) conducted research dealing with reactivity and its relationship to self-monitoring. During the baseline sessions the subjects were told to complete as many assignment problems as they could until told to stop. After the self-monitoring had been applied for several sessions the subjects were told to "try to beat their best score" (Kirby et al., 1991, p. 490). The results

showed that before the goal-specific instruction was given the subjects' performance was approximately the same. After the goal-specific instruction was given, all of the subjects showed improved performance. Goals give the subjects a target to aim for and enable them to evaluate their efforts compared to a legitimate standard.

Hayes et al. (1985) examined if private goal setting and self-reinforcement was more effective than public goal setting and social reinforcement. Students with significant studying difficulties were asked to read a passage and then to answer questions about it. Two groups of students were asked to answer as many as questions as they could correctly. One group was given their choice of candy to eat throughout the process and the other group was given a certain amount of candy depending on how many correct answers they score as a reward. The results showed that the group that was administered public or external reinforcement by others scored significantly more correct answers than the group that could access the reinforcement, candy, at any time they desired. This suggests that performance is dependent on the consequences but also on how the consequences are regulated. There seems to be greater effects if the goals attained produce reinforcement that cannot be achieved otherwise.

Not every individual desires to change his or her behavior but their goals may be socially controlled (Gillat & Sulzer-Azaroff, 1994), or required by treatment programs. All rehabilitation institutions require that their clients meet or exceed explicit goals of treatment before they can exit the program. Goals anchor the behaviors of individuals to conditions that allow for the best chances of desired outcomes. Goals serve as reference points in which to examine the results of one's efforts. Meeting the goals more often leads to achievement and success if the goals are meaningful and rigorous. The individual

can become aware of relationships between the amount of effort exerted and the end result. If the goals are correctly set, achieving the goals produces pleasure and is highly reinforcing. This feeling of success is a natural positive reinforcer but can also be in unison with external rewards such as passing to a higher grade level or receiving a pay increase at work.

Malott (1981) has written that meeting goals is not oriented toward receiving rewards but to avoid guilt from not meeting them, and that negative reinforcement drives individuals to complete their goals during self-monitoring. Rather than seeking positive outcomes that maintain the individual to continue to exert his energy to other goals, avoiding disappointment and feelings of failure actually drives the individual. In terms of behavioral analysis, measuring what behaviors increased or decreased is key to understanding the behavior. Several studies have been conducted (Ballard & Glynn, 1975; Broden, Hall, & Mitts, 1971; and Fixsen, Phillips, & Wolf, 1972) that show that self-monitoring can be most effective if it is used in conjunction with established reinforcement techniques, such as giving stickers or teacher praise. Avoidance of guilt would not be affected by any subsequent positive reinforcement because the negative reinforcement alone would suffice.

Self-Monitoring and Reactivity. One of the basic principles that separate us from other animals is our metacognitions (Ashcraft, 2006). To be aware of our thoughts and behaviors is a crucial component of being human. Yet individuals can become distracted by variables in the environment or can become hyper-vigilant to others' behaviors causing them to not pay attention to themselves. Self-monitoring is a tool used to help facilitate knowledge about oneself. Self-monitoring is a reactive measurement often

responsible for engendering the self-awareness. Reactivity is produced when the measurement device itself produces change in the target behavior (Rosenthal & Rosnow, 2008). Since the subject is also the observer, measuring the target behavior can immediately change as result of the observer/subjects noticing an excess or deficit of the frequency or quality of the target behavior. The changes are not controlled by the experimenter and often are sources of error. The reactivity produced by self-monitoring is a positive source of error in terms of behavioral analysis. The change is often in a therapeutic direction (Hayes & Cavior, 1977).

Kirby et al. (1991) examined the relative usefulness of two different self-monitoring techniques varying in obtrusiveness. They considered that more reactivity would result from a more obtrusive self-monitoring tool. Students were given either a less obtrusive device, a 13 cm x 21 cm sheet of paper kept in the desk, or a more obtrusive device, a 21 cm x 28 cm sheet of paper kept on the desk, and were asked to record the number of math problems they solved in a five minute period. The results showed that the children answered more questions when the device was kept on the desk than if it was kept in the desk or if it was absent, but only after goal-specific instruction was delivered.

It is important to keep in mind the reactivity effects on the target behavior. Not all behaviors can benefit from frequent self-monitoring and high reactivity. Critchfield (1999) had two swimmers perform self-monitoring tasks in order to measure the amount of distance swam in a 15-minute period. An alternative treatments format required them to self-monitor every two or four lengths, or at the end of the session. The results showed that the swimmers swam longer distances during the monitoring that was once a session. The reason for the results was because the swimmers spent less time swimming and more

time not swimming (self-monitoring). Even when self-monitoring and self-reporting takes a short amount of time, it still takes away from the task for which it is applied. The process of self-monitoring should not conflict with the target behavior.

Self-Monitoring and Accuracy. The self-monitoring tasks should not require a large amount of time, but it should be long enough for the subjects to realize the occurrence of the behavior more directly than they were before the use of self-monitoring. The self-monitoring task is not meant to be a detailed event-recording technique because it would consume too much time and effort, but rather, should allow the subject to become aware of the general happenings of the target behavior. The monitoring should employ short examinations of recent behavior that is highly representative of all behavior. It is not required for the self-monitoring implementation to be error free and highly accurate to be effective. Kirby et al. (1991) also examined the accuracy of the self-monitoring. They wanted to examine the relationship between correctly answering the self-monitoring questions and the rate of improvement. They discovered that there was not a strong relationship due to the fact that the most accurate recording showed the least reactivity and the least accurate record showed high levels of reactivity. They claimed that, "accuracy in self-recording is neither necessary nor sufficient for changes in the self-recorded behavior to occur" (Kirby et al., p. 492). Other research has produced similar results (O'Leary & Dubey, 1979) showing that accuracy of self-monitoring is frequently unnecessary in order to achieve desired outcomes.

Harris (1986) conducted research to examine the differential effects of self-monitoring of attentional behavior and productivity of on-task behavior and academic response rate. Four learning-disabled students that had been referred by the teacher for

low rates of on-task behavior were asked to either self-monitor the number of spelling words they correctly answered or to mark if they had exhibited any on-task behaviors in a fifteen-minute period. The research did not check to see the accuracy of the self-monitoring answers, rather, checked to see if they completed it. However, the teacher and experimenter also monitored the students target behaviors and periodic checks showed that the subjects were highly accurate and valid. The results indicated that self-monitoring increased on-task behaviors as well as academic performance. It is interesting to note that the subjects were not given a specific goal to meet. It could be that the subjects set their own goals or the increase of on-task behavior caused the subjects to be aware of the pre-established grading contingencies of the classroom.

Self-Monitoring and Treatment Implications. The goal of any treatment is to help the person function better in society. Treatment should serve as a stepping-stone or foundation to live successfully in all facets of society (Ninness, Fuerst, Rutherford, & Glenn, 1991). It is just not practical for the behavioral analyst to provide 24-hour supervision for the person, even though it might be the case for some populations. It is important to teach others how to correctly monitor their behaviors in different conditions and correctly manipulate variables to achieve their goals. It seems appropriate to implement self-monitoring to immediately improve socially significant behavior but to also facilitate generality for future behaviors.

Self-monitoring has been applied to a variety of problems ranging from nail biting to completing homework (Trammel, Schloss, & Alper, 1994). There have been many studies that included the self-monitoring technique to modify aspects of the education process because it is easy to implement. Gillat and Sulzer-Azaroff (1994) investigated the

relationship between the active involvement of the principal in the classroom and the academic success of the students. The experiment entailed the principal setting reading goals with the students and then periodically checking their progress. The students were taught self-monitoring techniques to record their progress. Self-monitoring was implemented because its, "simplicity allowed the students to quickly learn how to use the self-recording procedure and thereafter to complete it routinely each day" (Gillat & Sulzer-Azaroff, p. 123). Due to the ease of recording and evaluating the number of words read within a given period the principal could give feedback quickly. The results showed that the more the principal was involved the greater the academic success progressed.

Other research has shown that self-monitoring is a simple procedure (Kneedler & Hallahan, 1981) as well as cost effective (McLaughlin, Krappman, & Welsh, 1985). Teachers can easily teach the students how to record their behaviors using a non-invasive sheet of paper. The recording sheet can be placed in a folder and under materials on the desk and can be accessed quickly during self-monitoring periods. The teacher does not need outside assistance to analyze the results of self-monitoring.

This fluidity allows many populations to implement it. Harris (1986) successfully increased on-task behavior and indirectly increased academic progress in four learning disabled students with behavioral problems. Wood, Murdock, Cronin, Dawson, and Kirby (1998) successfully implemented the self-monitoring technique to increase on-task behavior for students that were at-risk of dropping out of school and declared self-monitoring as time- and cost-efficient. Even parents can implement it to help their children. Herbert and Baer (1972) studied the use of self-monitoring among mothers of deviant young children. One child was described as hyperactive, autistic and

schizophrenic and the other child was described as hyperactive and out of control and had been diagnosed with congenital brain malfunction. The results were similar to the above studies, showing that the self-monitoring technique was effective in improving the children's behavior; claiming the technique as "simple and economical" (Herbert & Baer, 1972, p. 139).

In summary, self-monitoring is not necessarily a successful tool. Sufficient and achievable goals need to be set and established in order for positive results to occur. The goals should not be easily attained but difficult enough so that a great amount of effort is exerted. There also needs to be attentiveness and awareness of the target behavior by the subject. Reactivity maintains the power of the self-monitoring process. Knowing the consequences one's behaviors enables one to understand what to manipulate in order to achieve those similar consequences again in the future. Self-monitoring returns the mastery of the environmental variables back to the subject as well as the recruiting of natural reinforcement from the environment. Knowledge of the functional relations of the immediate surroundings allows one to modify the discriminant variables one desires to achieve the consequences. To omit any of these elements will debilitate the technique and the outcomes will be diminished.

Problem

Rooney et al. (1985) trained students to use two different monitoring techniques while in the classroom. One procedure required that each time the subject was cued by an audible tone they would think if they were paying attention or not and then record either "yes" or "no" on an answer sheet. The second procedure required that when the subject completed a specialty marked item they would compare their answer to the correct

answer and mark either “yes” or “no” on an answer sheet depending if it was correct or not. The results indicated a general increase in academic performance and that there were no clear differences between the effects of the two procedures.

Harris (1986) designed a study similar to Rooney et al. (1985) in which she compared self-monitoring of attention and self-monitoring of productivity. Her self-monitoring of attention was essentially the same technique Rooney et al. had in their design. Self-monitoring of productivity required the students to make an overall judgment of performance at the end of each class period. She also found no clear differences between the two techniques, but an increase in academic performance.

It seems in both cases that comparing the two techniques to one anther could not produce comparable results indicating whether one technique was superior in producing an increase in academic performance because reactivity effects were equivocal. Self-monitoring of attention required frequent applications and the self-monitoring of productivity only occurred once at the end of the class period. Self-monitoring of attention had the potential of immediate reactivity effects on behavior. Self-monitoring of productivity occurred at the end of the day so the reactivity effects could only be observed the following day. In the Rooney et al. (1985) study self-monitoring of a broad behavior, attention, was compared to a specific behavior, number of correct answers. Harris (1986) results seem to be weak in the fact that she was comparing the rate of attending which are momentary judgments to general judgments about overall performance.

Lloyd et al. (1989) conducted a study that examined the effects of two different self-monitoring techniques on academic performance. They trained students how to

implement self-monitoring of attention (SMA) and self-monitoring of productivity (SMP) during class. The self-monitoring of attention entailed that the subject record either "yes" or "no" to indicate if they were paying-attention to the teacher or working on their assignment. Self-monitoring of productivity included that the subjects record the number of correct items they completed in a given interval of class. These changes produced comparable rates in behavior. Even with these modifications, the results found that no clear differences between the techniques. As in the other studies, enhanced academic performance was achieved. Interestingly, the treatment conditions only lasted for about fifteen minutes for each technique. The frequency of self-reporting averaged to about once every forty-five seconds. This is too invasive and disrupting to the natural schedule of completing the assignment. They also failed to allow the subjects to practice the technique for long periods so that they could potentially experience more reactivity.

Purpose

The purpose of the present research is to replicate and extend the Lloyd et al. (1989) research of self-monitoring which compared self-monitoring of productivity to self-monitoring of attention in order to examine the effects they have on academic performance. Ultimately, this research will be used to discover which techniques help the subject to be responsive to the teachers' academic evaluation and the feedback received throughout the class period. This study will increase each treatment session from 15 minutes to 30 to 45 minutes so that reactivity effects could be demonstrated and compared with more magnitude.

Research Question

This study was designed to investigate the following research questions:

1. What are the effects of self-monitoring of attention and the self-monitoring of productivity on the academic performance of children with learning disabilities?

2. What are the effects of self-monitoring of attention and the self-monitoring of productivity in terms of on-task behavior of children with learning disabilities?

3. Will the two self-monitoring techniques produce different results?

4. Will the monitoring schedule result in different results?

Hypotheses

1. The students' academic performance will improve from baseline conditions due to the implementation of SMA and SMP.

2. The students' on-task behavior will improve from baseline conditions due to the implementation of SMA and SMP.

3. Sessions in which SMP is implemented will produce more stability in on-task behavior tends than sessions in which SMA is implemented.

4. The students' that implement self-monitoring on a fixed interval schedule will produce higher rates of academic performance sooner than the students who implement self-monitoring on a variable-interval schedule.

CHAPTER 3

Method

Participants

The participants were four males. The students were receiving special education at a residential campus school facility. The students were diagnosed with learning disabilities and oppositional defiant disorder. The participants were chosen by their teacher who decided which students had the largest deficits in academic performance. All the participants had been attending the school since the beginning of the new semester which started eight weeks before baseline was collected. Participants were not deceived about the purpose of the study but were not told the hypotheses. Consent was obtained from each of the participants and their parents before treatment commenced.

Student 1 was a 9-year-old, Caucasian male. He was in the third grade and received special education working under an individualized education program (IEP) in the subject of mathematics. The participant is diagnosed as severely emotionally disturbed (SED) and learning disabled (LD).

Student 2 was a 10-year-old, Caucasian male. He was in the third grade and received special education working under an IEP in the subject of mathematics. The participant is diagnosed as being LD.

Student 3 was a 10-year-old, African American male. He was in the third grade and received special education working under an IEP in the subject of mathematics. The participant is diagnosed as SED, LD, and has mild mental retardation.

Student 4 was a 9-year-old, Hispanic male. He was in the third grade and received special education working under an IEP in the subject of mathematics. The participant is diagnosed as SED LD, and has mild mental retardation.

Setting

The study was conducted in two self-contained classrooms at a residential school for students described as having "sexually deviant behaviors" and "physically deviant behaviors." The study took place during mathematics instruction. Math instruction occurred each morning between the hours of 9 to 11. Two students from each classroom participated in the study. Each of the classrooms had only male students and sat in desks that made three rows of three or two desks about three feet apart.

Experimenter

The experimenter is a master's candidate at the University of Memphis in General Psychology. He has had previous experience with implementing self-monitoring in two previous studies.

Materials

The students received a recording sheet suited for the particular monitoring technique that they implemented, either the self-monitoring of attention (SMA) (Appendix C) or self-monitoring of productivity (SMP) (Appendix D) recording sheet. The experimenter had a timer to keep track of observation periods and a data collection sheet (Appendix A) to observe the students' on-task behavior and productivity. The experimenter also had a device that sounded a tone to indicate to the students when it was time to self-monitor. As soon as the student monitored it was recorded on the checklist

sheet (Appendix B). Before the project began the teacher received a list of responses (Appendix E) to the student that were appropriate during the sessions.

Dependent Variables

The dependent variables that were investigated are: on-task behavior and academic performance. On-task behavior was defined as looking at the teacher or the assignment, talking with permission, and working on completing the assignment or participating appropriately with the other students. Any exhibited behavior that was requested by the teacher was considered as on-task behavior. Laying one's head on the desk, doodling, looking out the window during the presentation, or not following teacher directions are examples of not being on-task. Academic performance was produced by the actual grade the student received from the teacher during classroom assignments, quizzes, and tests. The teacher did not require the students to complete the assignment during the math period but by the end of the day. Therefore, academic performance was obtained by producing a percent of correctly answered problems that they did complete by the end of the session. Academic performance, in the form of overall grade, was collected before and after treatment was implemented.

Independent Variables

The students implemented the self-monitoring of attention or self-monitoring of productivity depending on what was assigned for that period. Each implementation of the technique required the student to read and answer questions. SMA required the student to ask himself if he was paying attention to the teacher, working on his assignment, and if he had asked for help from the teacher within the last minute. SMP required the student to count the number of problems he had completed since the start of the class, for the

initial monitoring, and how many they have completed since the last monitoring time. The monitoring occurred at two different schedules; on a fixed 10-minute schedule and a variable 10-minutes schedule. The fixed 10-minute schedule required that the student monitor every 10 minutes. The variable 10-minute schedule required the student to monitor on average every 10 minutes so that the monitoring would seem to be at random times. The variable schedule was established before the period began. The students were not told what schedules they were using and only monitoring after they heard the monitoring tone.

Experimental Conditions/Procedures

Two different pairs of students were presented math instruction by their two different teachers. On-task behaviors and academic performance was collected by the experimenter during four sessions to produce baseline. Throughout baseline conditions the experimenter produced a tone, the same tone that was used during treatment conditions, every 10 minutes. This was to allow easier demonstration that the treatment conditions are responsible for control and not the actual tone. Each recording of the subjects' academic performance was recorded along with class' average academic performance to control for general teaching variance. Each baseline session lasted for the whole math period which varied day-to-day and classroom-to-classroom but on average 35 minutes.

Before the treatment conditions began each subject was explained the procedures of self-monitoring and gave their consent to the experimenter. The participants' parents were also informed about the procedure and gave their written consent. The subjects were trained how to correctly implement the self-monitoring techniques. The teachers

were given a checklist of expectations and guidelines to follow throughout the project so that they would not contribute to error in treatment (Appendix E).

Even though accuracy of monitoring does not seem to play a role, (Harris, 1986; and Kirby, Fowler, and Baer, 1991) the accuracy of recording was monitored throughout treatment to ensure that the subjects are implementing the treatment. At the end of each session the experimenter graded their recording sheet to check for accuracy. The experimenter compared the subjects' record to his own and gave them a percent grade. The accuracy was maintained above 85% throughout the monitoring procedure.

During treatment conditions the students were given a designated recording form that had been randomly assigned. The students were told to record either the number of problems they had completed within the last monitoring period, if they are implementing SMP, or were told to record if they had been paying attention to task or not paying attention to task, similar to the method that Rooney et al. (1985) employed, if they were applying SMA. Before each session the students produced a goal to achieve for each math period. Producing a goal was difficult because the students did not have important information about the assignment that would be assigned by the teacher. The teacher developed the assignments depending on what content was covered during the class so it was not available until the middle of the period. Due to this situation, the students produced a goal in which they thought was achievable with limited information about the assignment. The students did not know what monitoring technique the other students were implementing. Each session lasted the length of the math period and did not interfere with the teachers' presentation and agenda.

Research Design

The study was conducting using an alternating treatment design. Each technique and monitoring schedule was randomly assigned to each group. All random assignments were achieved through a random number generator, in which each condition had a corresponding number. The two students that formed each group implemented the same monitoring technique on the same schedule. The groups were not assigned the same technique and schedule more than two consecutive sessions. The math periods were generally held at the same time in two different classrooms so the groups never implemented the treatment concurrently. Due to the groups being in two different classrooms, treatment was alternated between each class every other session.

Observation and Recording

Data collection began during the summer of 2009. The experimenter collected on-task data by directly observing the students. The experimenter sat in the back of the room in the corner and did not engage any other students during observation. The students' on-task behavior was recorded every minute using a whole-interval time sampling. Due to the inconsistency of classes' start times, the sampling commenced immediately after the teacher started the math lesson. It ended when the teachers asked the students to prepare for the next class. The math classes entailed a presentation of material and an assignment reviewing the lesson. The experimenter used an observation sheet (see Appendix A) to record on-task behavior.

The teacher supplied the grades for each participating student at the beginning of the project before baseline was observed and at the end of the project after the students had engaged the monitoring techniques. The teachers also supplied the classes' average

grade. Since it was possible for the students to mark their recording sheets at any time during the sessions, the experimenter also used a checklist sheet to indicate rather or not the participants monitored at the appropriate time or not (see Appendix B). This was intended to track which students monitored during the sessions and the amount of monitoring they practiced correctly.

CHAPTER 4

Results

Academic Performance will Improve from Baseline

The examination of the data revealed that the self-monitoring techniques were not successful in increasing academic performance for special education students. Student 1's and student 2's class grade decreased from 86% to 68% and 87% to 73% respectively (refer to Table 1). Students 1 and 2 were in class 1. The average academic performance for class 1 before treatment was 75% and after treatment it dropped to 68%. Student 3 and student 4 were in class 2. During the course of this project, the teacher was often canceling or moving the math period time and did not regularly teach the participants. The teacher eventually switched classes and no longer taught the class. Instead of a regular class agenda and teacher, class 2 received substitute teachers and math assignments that had not been legitimized by their IEP. Due to the variability and unstructured academic agenda the project was discontinued with class 2.

Examination of the data during baseline and treatment indicates that there were low amounts of progress in academic performance for all students except student 1. He was also the only student to not turn in work during the study and received a zero which diminished his mean academic performance. Student 1's mean academic performance decreased from 78% to 61% (refer to Table 2 and 3). Student 2's mean academic performance increased from 33% to 68%. Student 3's academic performance increased from 87% to 94%; but there was no difference for student 4's academic performance which remained at 91%.

Table 1
Academic Grades

Subject	Before Treatment	After Treatment
Student 1	86%	68%
Student 2	87%	73%
Student 3	70%	X
Student 4	76%	X
Class 1	75%	68%
Class 2	73%	X

Note. The grade percentages were provided by the teachers of the classes. The grade percentages incorporated all material from the math lesson not just the material reviewed during sessions.

Table 2
On-Task Behavior and Academic Performance during Baseline

Participant	Mean On-Task Behavior	Range	Mean Academic Performance	Range
Student 1	71	27(86-59)	78	41(100-59)
Student 2	53	76(93-17)	33	100(100-0)
Student 3	77	31(97-66)	87	40(100-60)
Student 4	71	27(86-59)	91	17(100-83)

Note. These score range from zero to 100

Table 3
On-Task Behavior and Academic Performance during Treatment

Participant	Mean On-Task Behavior	Range	Mean Academic Performance	Range
Student 1	67	54(92-38)	61	100(100-0)
Student 2	76	33(92-59)	68	80(100-20)
Student 3	97	10(100-90)	94	17(100-83)
Student 4	87	23(96-73)	91	19(100-81)

Note. These score range from zero to 100

On-task Behavior will Improve from Baseline

Review of the data shows that on-task performance increased for all the students except student 1. Student 1's on-task performance decreased from 71% to 67% and student 2's on-task performance increased from 53% to 76% (refer to Table 2 and 3) Student 3's mean on-task performance increased from 77% to 97% and student 4's on-task performance increased from 71% to 87%. The teachers in class 1 spent more time presenting lessons to the whole class than the teachers in class 2. The teachers in class 2 would give a brief review of material then give the assignments to the students and work one-on-one with the students. This might account for the differences between on-task performance for each class.

SMP will Produce more Stability in On-task Behavior Tends than SMA

Contrary to Lloyd's (1989) results, there was a difference between the monitoring techniques in relation to on-task performance and academic performance (refer to Table 4 and 5). Self-monitoring of productivity produced more stability in on-task behavior tends. All of the student s' on-task behavior was greater during the SMP conditions. During SMP conditions students' on-task behavior mean was 89% with a mean range of 16 while during SMA conditions the mean was 75% with a range of 28. SMP also produced higher levels of academic performance resulting in a mean of 87% with a range of 24 while SMA resulted in a mean of 72% with a range of 58. Only student 3 did not have greater academic performance during SMP conditions than SMA but he only implemented SMA during one session before the project was terminated.

Table 4
SMA Treatment Data in Relation to Target Behaviors and Ranges

	Mean On-Task Performance	Range	Mean Academic Performance	Range
Student 1	56	39(77-38)	44	92(92-0)
Student 2	71	28(87-59)	56	64(84-20)
Student 2	71	28(87-59)	56	64(84-20)
Student 3	90	0	100	0

Notes. Data collected over five SMA sessions for student 1 and 2. Student 3 implemented one session of SMA and student 4 implemented two sessions.

Table 5
SMP Treatment Data in Relation to Target Behaviors and Ranges

	Mean On-Task Performance	Range	Mean Academic Performance	Range
Student 1	80	24(92-68)	81	29(100-71)
Student 2	83	18(92-74)	82	35(100-65)
Student 3	100	0	91	17(100-83)
Student 4	93	6(96-90)	93	15(100-85)

Notes. Data collected over four sessions for student 1 and 2. Student 3 and 4 had implemented two SMP sessions.

Student 1 exhibited on-task behavior at a higher percentage during SMP than during SMA (refer to Figure 1), however it did not equal higher percentages in academic performance, which was highly variable. Student 1 produced more stable academic performance during SMP conditions but yielded two occasions of high academic performances during SMA conditions (refer to Figure 2). Student 1 would often get out of his seat without permission and wander around the room, during this time he would not be working on his assignment.

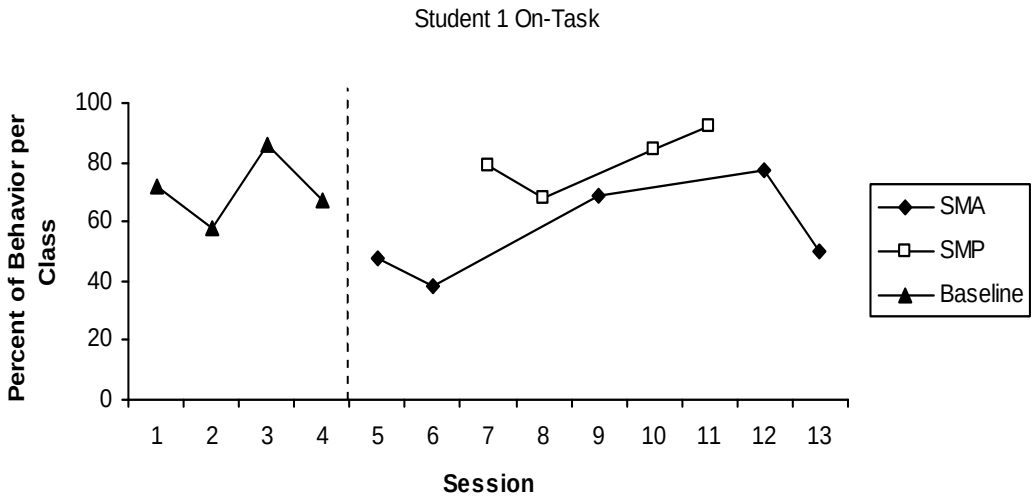

Figure 1. Percent of on-task behavior during baseline and treatment conditions.

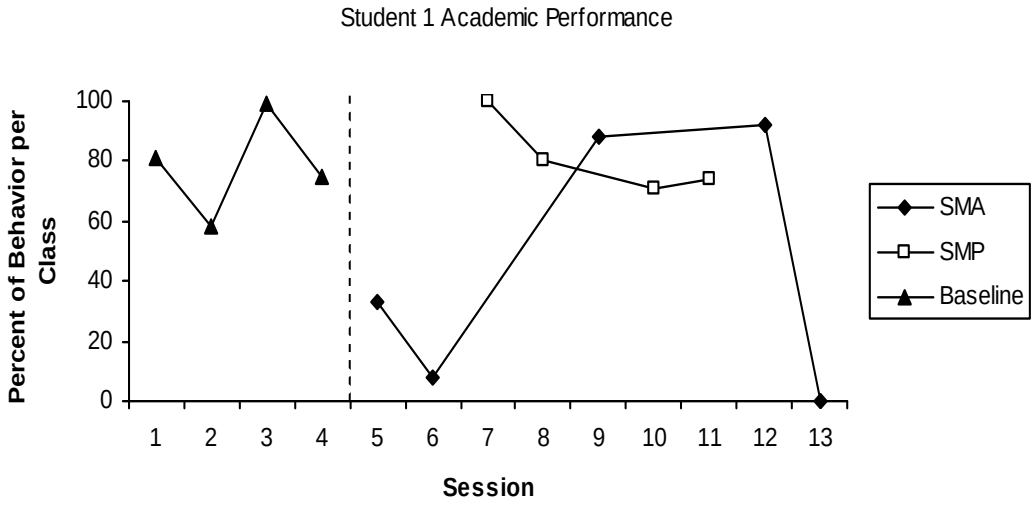

Figure 2. Percent of academic performance for baseline and treatment conditions.

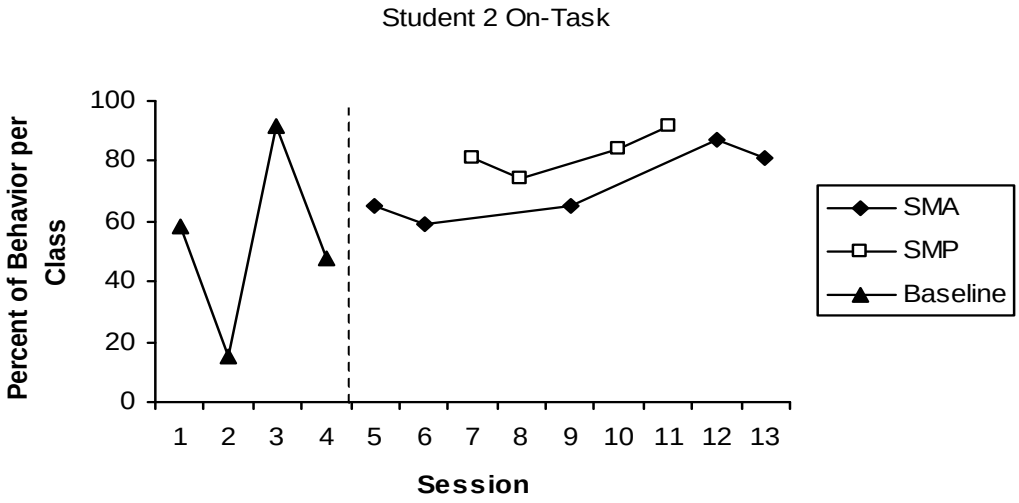

Figure 3. Percent of on-task behavior during baseline and treatment conditions.

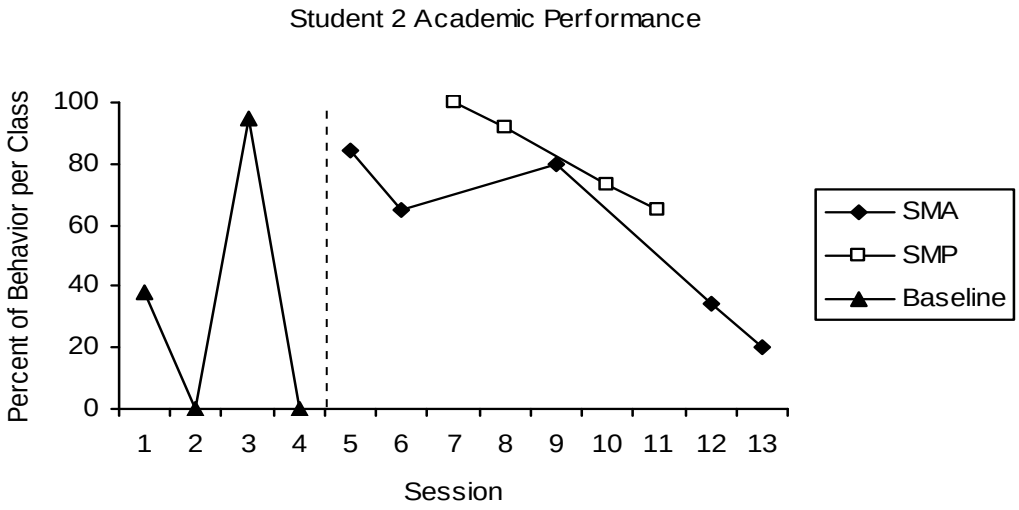

Figure 4. Percent of academic performance for baseline and treatment conditions.

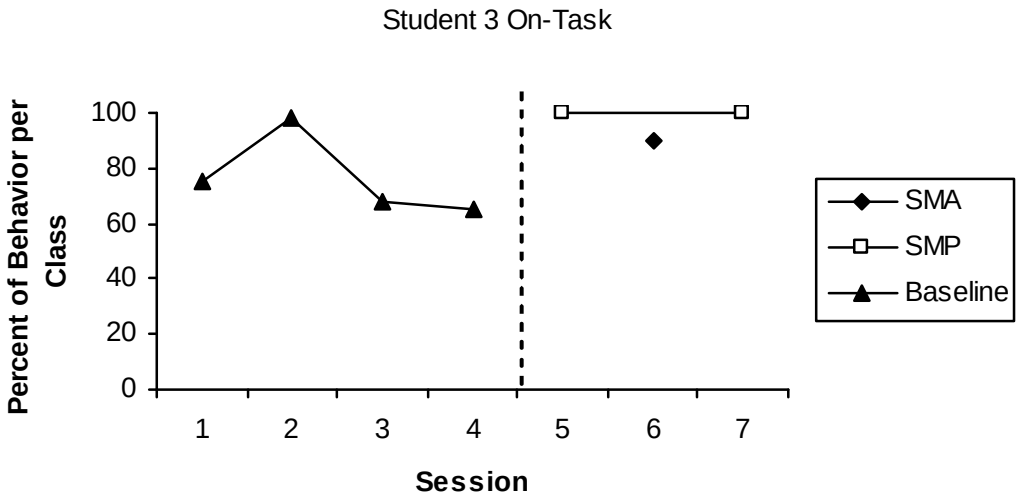

Figure 5. Percent of on-task behavior during baseline and treatment conditions.

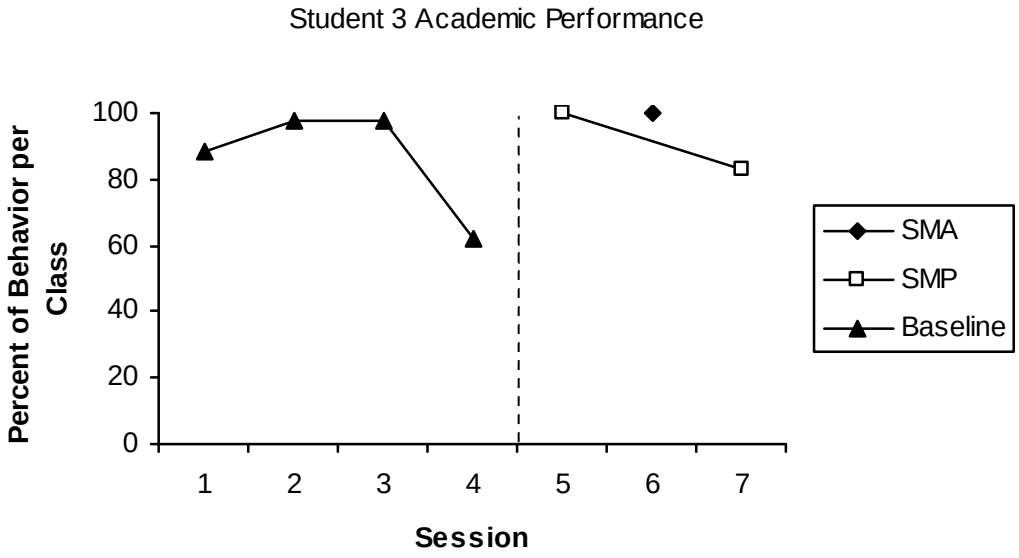

Figure 6. Percent of academic performance for baseline and treatment conditions.

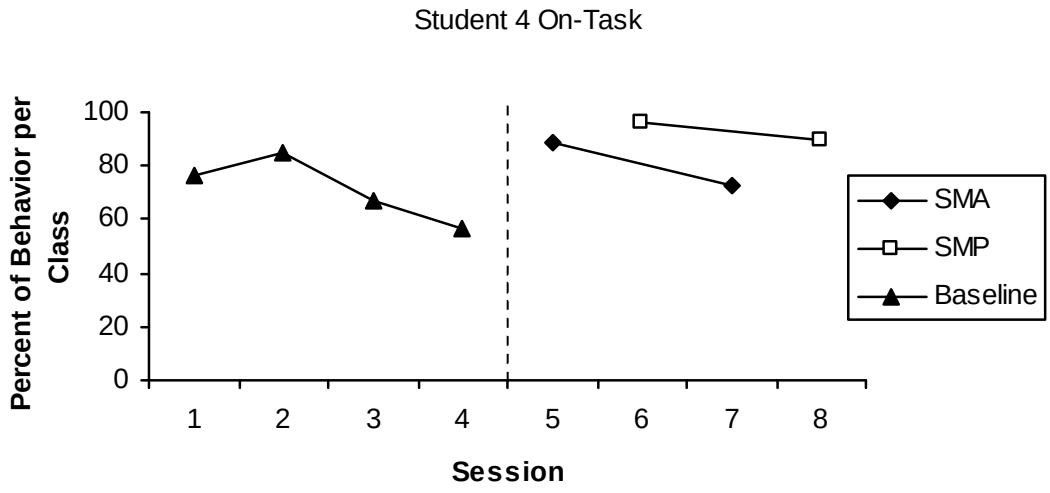

Figure 7. Percent of on-task behavior during baseline and treatment conditions.

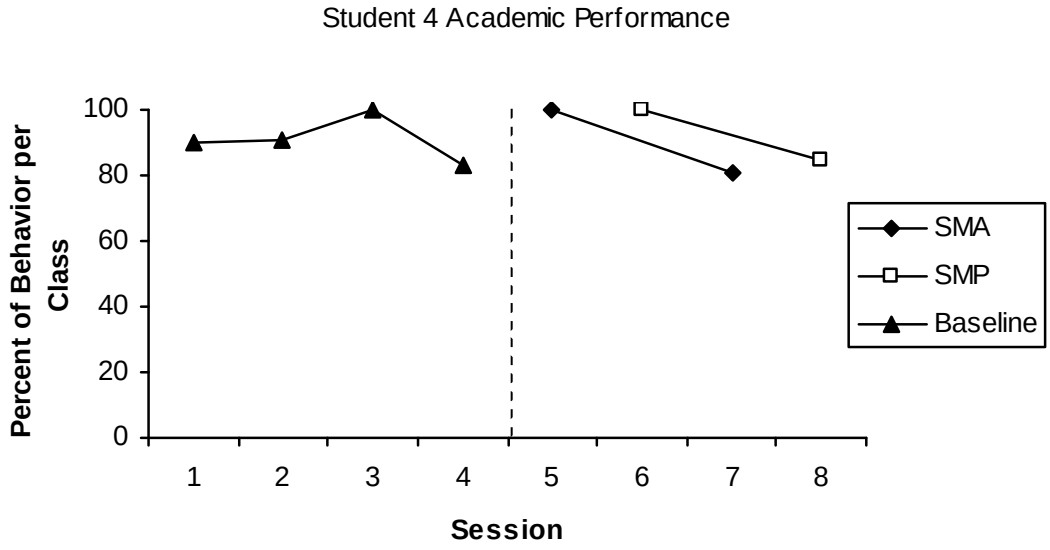

Figure 8. Percent of academic performance for baseline and treatment conditions.

Student 2 also produced higher rates of on-task behavior during SMP than SMA conditions (refer to Figure 3). This student would remain in his desk but often talk-out to other peers. Since he was in his desk most of the time he would work on his assignment but in attempt to just finish it, producing low effort attempts resulting in low accuracy performance (refer to Figure 4).

On-task performance remained 100% during SMP conditions and only slightly lower during the SMA condition resulting in 90% (refer to Figure 5) for student 3. His baseline on-task behavior was 77% and was collected before he knew the experimenter was observing him. With only three sessions of implementation it cannot be concluded that the technique was controlling his behavior. He also produced high academic performance during the treatment conditions overall suggesting that his behavior might have been influenced by knowing that he was a participant in a project (refer to Figure 6).

Student 4 produced higher rates of on-task performance during SMP conditions than SMA conditions but only had two sessions of each (refer to Figure 7). His academic performance remained stable with little to no variation between the two conditions; with difference being 2% (refer to Figure 8). This student always finished his assignments and was assigned more work than the other students. The results from class 2 indicated that the students performed target behaviors at high percentages throughout the project regardless of the technique.

Fixed Interval Schedule will Produce Higher Rates of Academic Performance sooner than Variable-Interval Schedule.

The schedules of monitoring did not make any notable difference in target behaviors but there were not enough sessions to conclude any effects of implementing the

techniques on a variable schedule. Due to limitations in scheduling sessions, the study used a fixed schedule for the last six sessions. This occurred so comparisons between the two techniques could be better controlled.

Reliability

Interobserver agreement (IOA) could not be assessed for this study. Due to unforeseen circumstances, the teacher-assistant was unable to record the IOA for the on-task behaviors of the participants.

Social Validity

Each of the teachers and students were asked if they considered self-monitoring to be useful and if it they think it helped. The teachers commented that treatment might have mildly controlled the students' behavior but did not think it hindered or facilitated academic performance. The teacher reported that the procedures did not distract him or seem to distract the other students. The teachers were not told which monitoring technique was used each session so they were not asked about their judgment about the differences between the two techniques. Student 1 reported that he enjoyed monitoring but did not think it facilitated greater learning. He commented that he preferred the monitoring of productivity because it required reading fewer questions. Student 2 thought the monitoring was fun and that it did not "bother" him. He preferred the monitoring of productivity because it has fun to see how many questions he had completed each monitoring period. Both students reported that it was easy to use and did not interfere with their work. Students 3 and 4 were indifferent to the techniques but said that implementing them were easy. They were asked if it was helpful and they both commented that it did not help them or hinder them. Student 4 commented that he would

not want to implement it on a regular basis. He was asked if it interfered with his work and he said that he did not like remembering to monitor but beside that it did not interfere. The experimenter was not able to contact the teacher to gather social validity.

CHAPTER 5

Discussion

The self-monitoring techniques did not facilitate any progression in academic performance and were not powerful enough to induce the students to remain focused on completing their assignment or increasing their accuracy on the assignment. The students' monitoring of behavior did not compel them to choose to increase target behaviors. The pre-existing influences in the classroom allowed greater reinforcement of the inappropriate behavior over the target behaviors. This inefficacy resides in the weakness in reactivity of the techniques.

The self-monitoring tools are intended to help the student increase and maintain the target behaviors and to protect the student from environmental distractions. The environmental distractions are more appealing behaviors and/or competing thoughts that interfere with task performance (Reid, 1996). The procedure did not control for these environmental distractions. The influence of extraneous variables was stronger than the reactivity effects that might have been produced.

During sessions other classmates would often disrupt the lesson. This caused the teacher to intervene and deal with the student and therefore he did not teach. This down time did not require the participants to engage in any tasks. The participants were also targeted by other classmates and provoked by them resulting in retaliation by the participant and further disruption of the lesson. For example, during one session a classmate became upset and aggressively turned his desk over, hitting the back of student 1's seat. In turn, student 1 stood up and started to cuss at the unruly classmate. The teacher had to stop the lesson and intervene to deal with the altercation. Events common

to this regularly occurred which provided a source of entertainment for the rest of the class and the participants.

The monitoring techniques are also intended to assist the participants to focus on appropriate, on-task behavior (those making up the classroom rules). The teacher frequently would not follow the classroom rules and procedures allowing the appropriate behaviors to be weakly identified by the students. For example, the teacher reported to me that the students are not allowed to talk unless they raise their hand and receive permission and the students are aware of this rule. Most of the time when the students would talk out the teacher would not correct them but instead reinforce their behavior by answering them. It seems that if the rules were enforced consistently and better defined the reactivity effects of monitoring might have facilitated greater learning. For when the student monitors that he "talked-out" he might better connect it to the inappropriate behavior. When the consequences for talking-out are reinforcing it seems that the reinforcement overrides any potential benefit that may occur from being cognizant that they were not following the rule if they are self-managing talk-outs. There is little value and direction for the students to know that they talked-out so there is no reactivity to follow the rules. The teacher often unintentionally rewarded talk-outs, getting out of seat, and not working on assignments and infrequently attempted to prompt the students toward wanted behavior.

Limitations

It is important to note that the students accurately monitored their behavior. The self-monitoring technique was successfully implemented and the students were able to attend to the monitoring tone and correctly recall their behavior. It could be the case that

monitoring on average every ten minutes was too infrequent. On average the students only engaged in self-monitoring three times per period. The periods always varied in length ranging from 30 to 50 minutes. Lloyd et al., (1989) required that the students monitor as frequently as every 45 seconds for 15 minute periods. Increasing the amount of monitoring might have increased the reactivity effect. Also, sessions did not occur regularly. Due to unplanned cancellations and rescheduling of math periods by the teachers, school holidays, and conflicting appointments, such as the participant having to meet with their doctors or counselors, sessions did not occur consistently. However, this should not have been a huge problem due to accuracy of monitoring and implementing the techniques.

Even though the students chose personal academic goals the students did not ever meet them. Without setting a goal the effectiveness of self-monitoring is significantly decreased (Locke & Latham, 1990) but investigation in meeting or not meeting these goals would be beneficial. The goals were set before the lesson was taught and before the students saw their assignment. This was done so that class was not interrupted. They did not have any idea how difficult the material would be or how many problems they would be given. Future studies could have the students and teachers to confer in order to generate the goals.

There was no set goal in terms of on-task behavior and the students were not told that their behavior was being recorded. The agency has classroom procedures in place to control and direct the students' behavior with the understanding that they will continually conduct on-task behavior. Both teachers in these classrooms did not follow procedure to direct behavior. This is interesting due to the fact that the target behaviors fluctuate

together. It makes sense that when a student's tasks become difficult that the student would want to escape or not participate and as they are off-task their academic performance worsens. The findings show that even when the students remain on-task for most of the period their academic performance still decreased.

The operational definition of academic performance was not highly representative of actual academic progress and comprehension. Academic performance was operationally defined as the percent of correctly answered problems that were complete by the end of the session. This means that if they only completed five problems by the end of the session and four were correct they would earn 80%. If they completed 10 but only correctly answered five, which is actually more than the other student, they would receive 50%.

The results were derived from 13 independent sessions. The project was stopped due to the lack of benefit it was causing. The results indicated that the academic performance was diminishing and even though the causation was unknown, the experimenter did not want to potentially contribute to the problem. There were not as many sessions as desired to derive the results and the data should be examined with this in mind. The data collected from class 2, student 3 and 4, are extremely weak due to only consisting of two treatment sessions for each technique. Class 1 only had nine sessions, four being SMP and five being SMA.

In addition, Interobserver agreement data were not collected due to the designated observer being indisposed or absent. The teacher-assistants in each room agreed to record on-task performance of the students during treatment but could not the whole period due to unforeseen demands of assisting the teacher and helping other students. When the

teacher-assistants were able to collect IOA they would not correctly record it or it would be incomplete. The turnover rate for the teacher-assistants also hindered adequate training of how to accurately record on-task behavior. Generally, disruptive students in the classrooms rendered an urgency of assistance by those who were planned to conduct IOA.

Future Research

It is important to recognize that academic performance for the whole class decreased during the study. It could be that the introduction of new material increased the difficulty of the assignments. The participants' baseline academic performance was lower than their average grade. This shows that a descending trend in academic performance was present before the treatment began. The monitoring techniques are intended to regulate the person's awareness of their behavior and not to assist the student in understanding material. The teacher's role is to make sure the students learn what is taught and the role of the monitoring technique is to help the student pay attention to the teacher. Future uses of the monitoring techniques should be seen as a complimentary tool and not a teaching device.

Future research should use a rate and accuracy percent to measure academic performance. The academic performance in this study was weakly representative of the actual academic performance because it measured only accuracy and did not factor in the rate in which the students completed problems. It is important to increase accuracy and speed at which problems are completed by the students; not just the accuracy.

Some authors suggest that the focus of research in self-monitoring should be concentrated on the academic performance rather than attending (Klein, 1979; Snider,

1987). They believe that self-monitoring of academic performance will provide greater benefit than the self-monitoring of on-task behaviors or other auxiliary monitoring. This line of thinking seems to be valid according to the results found from this study. Self-monitoring is extremely useful and can be implemented to assist many students to achieve better grades but only in those students that have the ability to learn the new material. Self-monitoring techniques should be used with students who have difficulty in paying attention; not with those who simply have a difficulty in learning the material. For the students who have a difficulty learning the problem resides in teaching mediums not attending deficits.

The SMA sheet involved the student asking himself three questions. They were "Was I paying attention to the teacher?", "Was I working on my assignment?", and "Have I asked for help from my teacher?" These three questions were chosen due to the ease of reading them and answering them. Each question focuses on aspects of the students' role. They should focus on the teacher during presentation and should work on the assignment as directed; if they have questions at any time during those tasks they should ask the teacher or look for the answer. There could be some elements of this specific SMA that is less effective than other SMA techniques. Future research could modify the questions to examine the essential qualities of an effective SMA technique. It is also useful for the SMA technique to be specific to the idiosyncratic problems the student is experiencing. For example, student one was the only participant that left his designated area during class. The SMA should include a question such as "Was I in my seat?" so that he could monitor that aspect of his behavior. Each question included is important because each specific questions leads to specific reactivity effects which is

oriented to suit the needs of the student. Future studies should increase the number of sessions and have an equal number of each session across techniques and classrooms. This will allow for greater demonstration of treatment effects and lead to greater comparison data.

Conclusion

Even though this project did not verify the effectiveness of SMA and SMP in the classroom, it did supply some important information on what to not include in future research. Shorter durations between monitoring periods and denser monitoring schedule might lead to more effective treatment. The content of the SMA should be chosen with a reactivity direction in mind before it is constructed. Stability in the teaching practices is warranted as priority before implementations of the techniques occur. Implementation of self-monitoring should cease immediately if the teachers are not maintaining the classroom rules. Retraining should be administered so that the teachers can effectively shape the students behaviors according to the classroom rules. This study suggests that the techniques are not powerful enough to shape behavior alone. Future studies should work with the teachers to discover the hindrances affecting the students and only implement self-monitoring if the student has trouble with paying attention. Continuing to study the limitations of self-monitoring in academic performance and on-task behavior is important so that implementation does not exceed the purview of self-monitoring.

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Appendices

Appendix A
Observation Sheet

Observation Sheet

Date_____

	Student 1		Student 2	
	Occurred	DNO	Occurred	DNO
1				
2				
3				
4				
5				
6				
7				
8				
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14				
15				
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44		
45		

Appendix B
Checklist Sheet

Date_____

Student 1

Monitored	YES	NO
1		
2		
3		
4		
5		
6		

Student 2

Monitored	YES	NO
1		
2		
3		
4		
5		
6		

Notes:

Appendix C

Name____________ Date__________

Self-Monitoring of Attention Recording Sheet

Was I paying attention to the teacher?	YES	NO
Was I working on my assignment?	YES	NO
Have I asked for help from my teacher?	YES	NO

Was I paying attention to the teacher?	YES	NO
Was I working on my assignment?	YES	NO
Have I asked for help from my teacher?	YES	NO

Was I paying attention to the teacher?	YES	NO
Was I working on my assignment?	YES	NO
Have I asked for help from my teacher?	YES	NO

Was I paying attention to the teacher?	YES	NO
Was I working on my assignment?	YES	NO
Have I asked for help from my teacher?	YES	NO

Was I paying attention to the teacher?	YES	NO
Was I working on my assignment?	YES	NO
Have I asked for help from my teacher?	YES	NO

Appendix D

Name_____ Date_____

Self-monitoring of Productivity Recording Sheet

How many problems have I completed? _____ no work assigned

How many problems have I completed? _____ no work assigned

How many problems have I completed? _____ no work assigned

How many problems have I completed? _____ no work assigned

How many problems have I completed? _____ no work assigned

Appendix E

Teacher checklist

1. Continue with agenda as planned and follow agency procedures when directing the student with class work and behavior.
2. If the student asks for help it can be given as needed.
3. If the student asks for help to self-monitor it can be given.
4. If the student shows the teacher that he has been self-monitoring or refers to the self-monitoring tool the teacher should give brief positive statement, tell them that it is not time to talk about the tool, and redirect the student to the class assignment.
5. If the student tells the other students about self-monitoring tool the teacher should ask the student to refrain from talking-out and redirect him to the class assignment.
6. The self-monitoring sheet can be placed inside the desk until it is time to monitor.
7. The student can take the sheet out to monitor and then should be placed back inside the desk after the monitoring has occurred.

University of Memphis IRB # H 10-04
Approval of this form expires 8/11/10

Dear Parents:

We would like to investigate the effects of teaching children to self-monitoring academic productivity and on-task behavior to see if this method has positive effects on the student's on-task behavior (paying attention to the teacher or materials) and academic productivity (number of problems completed) during independent seat-work. We are requesting that your child participate in this study. The research should take no more than 12 weeks to complete. First, we will teach your child how to monitor his/her own behavior during independent seat-work. This portion of the study should take about a week to complete. Then, we will collect data 3 to 5 days per-week when your child is either monitoring his/her own on-task behavior or academic productivity during independent seat-work. At the conclusion of the study we will ask your child which method he/she preferred, if any.

There are no known risks to participation in this study. The procedures are ones that are typically used in many classrooms. The benefits of participation in this study include, possible increases in academic performance and on-task behavior during class for the students who participate in the study. In turn, the whole class could benefit from less distraction and more teacher presentation. The participants could become more self-aware and more effectively self-manage their behaviors. You are free to remove your child from participation in this study at any time without penalty to him/her or yourself. If we disseminate the results of this investigation publically we may use data that identify demographic information (e.g., age, sex, reading scores), however, we will not identify the students by name or use any information that could reveal their identity. We will maintain your child's confidentiality to the fullest extent of the law. If you have any questions or concerns at any time you are encouraged to contact either myself at kcervetti@memphis.edu (901) 240-3771, Dr. David Bicard at dbicard@memphis.edu, (901) 678-1680, or Dr. Megan McDevitt-Murphy at mmcdvttm@memphis.edu, (901) 678-2891 . You may also contact the Chair of the Institutional Review Board for the Protection of Human Subjects at The University of Memphis at 678-2533.

Thank You,

Kirk Cervetti

Dr. David Bicard, Ph.D., BCBA

I agree to allow my child _____ to participate in a study entitled *A comparison of self-monitoring of attention and self-monitoring of productivity in relation to academic achievement and on-task behavior among students receiving special education* conducted by Kirk Cervetti. I have read and understand the procedures of this study and any question I have raised have been answered to my complete satisfaction. I understand that I am free to withdraw my consent for my child to participate in this study at any time with no penalty to my child or me. Furthermore, I understand that my child's identity will not be revealed in any way should the results be presented publically and that confidentiality will be maintained to the fullest extent of the law.

Finally, I acknowledge that I have fully read the consent form. I sign it freely and voluntarily. A copy has been given to me.

_____ _____
Signature of Guardian Date

_____ _____
Signature of Participant Date

_____ _____
Kirk Cervetti, Co-Investigator Date

_____ _____
Megan McDevitt-Murphy Date