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Use of Strategic Self -Monitoring to Enhance Academic Engagement, Productivity, and Accuracy of Students With and Without Exceptionalities

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Abstract:

This study investigated the effects of a strategic self-monitoring intervention (i.e., The University of Alabama ACT-REACT) on the academic engagement, nontargeted problem behavior, productivity, and accuracy of students with and without disabilities. Seven boys and two girls of elementary age who received their educational services in two different inclusive classrooms participated in this investigation. The students were taught to use the ACT-REACT strategy during independent math/reading seatwork. ACT-REACT is a combined self-monitoring of attention and self-monitoring of performance intervention designed to help chronically disengaged students take control of their learning. A multiple-baseline-across-subjects design with an embedded reversal indicates that ACT-REACT was an effective strategy for fostering self-management and enhancing the academic performance of students with differing needs in inclusive classrooms.

Article:

The relationship between learning and academic engaged time is strong and has been clearly established in the literature (Cancelli, Harris, Friedman, & Yoshida, 1993; Curry, 1984; Nystrand & Gamoran, 1989). In a seminal investigation of students' engaged academic behavior in secondary classrooms, Frederick (1977) found that high-achieving students were academically engaged 75% of the time, compared to 51% for low-achieving students. The longer students remain disengaged from tasks, the more likely their academic performances will suffer, resulting in undesirable outcomes.

The issue of chronic disengagement is particularly problematic for students with exceptionalities who receive their educational services in inclusive classrooms. These students often demonstrate diverse cognitive abilities, evidence multiple and varied instructional needs, and perform academically above or below their same-age peer group (Friend & Bursuck, 1999). Also, many students with differing types of exceptionalities function well below national normative levels in measures of cooperation, assertion, and self-control while demonstrating elevated scores for externalizing behavior problems, hyperactivity, and inattention (Gresham, MacMillan, & Bocian, 1996). Combined, these educational characteristics render students with exceptionalities vulnerable to disengaging from tasks requiring independent work.

Compounding the aforementioned academic and behavioral problems are the amounts of time students with exceptionalities are required to engage in passive seatwork activities. Parmar and Cawley (1991) found that in many classrooms, the completion of lengthy worksheets requiring rote practice was a common approach to mathematics instruction. Similarly, Vaughn, Levy, Coleman, and Bos (2002) synthesized 16 observational studies of reading instruction for students with learning disabilities or emotional/behavioral disorders across a variety of settings and concluded that independent seatwork and worksheets consumed much of the instructional time.

Over the last three decades, a myriad of intervention approaches to combat academic disengagement has appeared in the literature. Unfortunately, the prolific research pertaining to academic engagement intervention approaches has had little effect on inclusive classroom practice. This is evidenced, in part, by the provision of largely undifferentiated instruction for students with exceptionalities in general education classroom settings (Baker & Zigmond, 1990; McIntosh, Vaughn, Schumm, Haager, & Lee, 1993; Vaughn & Schumm, 1994).

The dismal portrait of the educational infrastructure in inclusive classrooms may be explained by research indicating that general educators feel ill prepared to teach students with disabilities and struggle to meet the needs of these students (Schumm & Vaughn, 1995). These same researchers unveiled that although teachers may want to meet the needs of students with exceptionalities, they maintain that excessive teacher workload responsibilities, demands for substantial content coverage, and negative student reactions prevent them from doing so. Because in its Twenty-Second Annual Report to Congress, the U.S. Department of Education (2000) confirmed that the majority of students with exceptionalities receive all or part of their education in the general education classroom setting, it is important to conduct additional research that validates "effective procedures for managing behavior and increasing the academic involvement of children with disabilities within the context of general education" (Koegel, Harrower, & Koegel, 1999, p. 26).

One strategy that may be pertinent to this effort is self-monitoring. For more than two decades, educational researchers have successfully used self-monitoring interventions within the context of special and general education settings to increase students' academic engagement and productivity. Seminal and contemporary inquiries (see Dunlap et al., 1995; Haas-Warner, 1992; Mathes & Bender, 1997; Prater, Joy, Chilman, Temple, & Miller, 1991; Shimabukuro, Prater, Jenkins, & Edelen-Smith, 1999) documented clearly that self-monitoring is an effective behavioral intervention to increase academic engagement, decrease disruption, and enhance academic skills, including productivity and accuracy (Carr & Punzo, 1993; DiGangi, Maag, & Rutherford, 1991). This holds across content areas, such as arithmetic and reading (Bray, Kehle, Spackman, & Hintze, 1998; Dunlap & Dunlap, 1989; Harris, 1986; Kozleski, 1989; Lalli & Shapiro, 1990; Levendoski & Cartledge, 2000; Maag, Rutherford, & DiGangi, 1993; Skeans, 2000). Important to note is that many studies focused on the use of self-monitoring during drill and practice activities; thus, there is still some question regarding its effects when students are learning new material (Levendoski & Cartledge, 2000; Reid, 1996).

Although self-monitoring is an effective intervention, there is debate regarding the superiority of self-monitoring of attention (SMA) versus self-monitoring of performance (SMP; Maag, Reid, & DiGangi, 1992). SMA interventions direct the student's focus toward measuring and recording his or her attending behaviors, whereas SMP interventions involve teaching the student to measure and record his or her academic performance (Reid & Harris, 1993). The literature has indicated that SMP approaches may be superior in some instances, although overall the findings appear mixed (Reid, 1996). No studies were found in which the researchers employed SMA and SMP interventions concurrently.

Another limitation in the self-monitoring literature is that the majority of the research was conducted in special education classroom settings (Webber, Scheuermann, McCall, & Coleman, 1993). Of the few studies conducted in mainstream or inclusive settings, all achieved increases in student engaged academic behavior, productivity, or accuracy. Moreover, Rooney and Hallahan (1988) demonstrated that the use of self-monitoring interventions reduced the special education student's need for teacher assistance. In terms of professional practice in inclusive classrooms, two studies (Fuchs, Fuchs, & Bahr, 1990; Fuchs, Fuchs, Bahr, Fernstrom, & Stecker, 1990) confirmed that educators view multicomponent, self-monitoring intervention packages as acceptable for use in general education classrooms and useful for reaching difficult-to-teach students. Reid (1996) pointed out one explanation for the latter is that as students' behavior improved, in part as a result of their use of the self-monitoring interventions, so did the relationship between the student and the teacher. However, what remains unknown is whether students in inclusive classrooms with differing exceptionalities, as well as those without exceptionalities, can benefit from the same type of self-monitoring strategy.

Although the knowledge base regarding the benefits of self-monitoring is substantive, there continue to be gaps, as noted earlier. Therefore, the purpose of this study was to evaluate the effectiveness of a combined SMA +

SMP self-monitoring intervention strategy (i.e., ACT-REACT); to assess the effectiveness of strategic self-monitoring with students, both with and without exceptionalities, having different academic and behavioral needs in the general education classroom; and to determine the applicability of the self-monitoring strategy across various stages of learning, including new content.

Method

PARTICIPANTS

All of the teachers in three local schools (85 teachers) were invited to refer students in their classrooms who were actively or passively disengaged from the learning process on a daily basis. Two teachers in one elementary school responded. One teacher in a second/third-grade multiage classroom and one in a fourth/fifth-grade multiage classroom identified three and six students, respectively, to participate in the study. The teachers requested that the ACT-REACT intervention be used with the nominated students during independent seatwork because they found that activity to be the most problematic. Of the nine children participating in the study, one student, Mason, was gifted. Two, Danielle and Anna, were considered “typical” or nonexceptional, and five, John, Lucas, Won, Buck, and Bill, had differing labels of exceptionality.

John was an 11-year-old Caucasian boy identified as having Asperger syndrome. John was actively disengaged during math and often exhibited disruptive behavior, including calling out, making noises, yelling at peers, throwing explosive temper tantrums, and sharpening his pencil obsessively.

Mason was a 9-year-old Caucasian boy identified as gifted. Mason was disengaged passively during independent math seatwork on a daily basis, characterized by staring, whispering to self and peers, doodling, and toying with pencils, computers, and so forth. Mason was promoted a year early into the fourth/fifth-grade classroom, hence his relatively younger age.

Lucas was a 13-year-old Caucasian boy identified as having Floating Harbor syndrome with speech and language impairment. Until the 2001–2002 school year, Lucas had been provided with one-to-one paraeducator support in the general education classroom. Similar to Mason, Lucas was disengaged passively during independent seatwork, characterized by frequent gazing around the classroom, talking to peers, excessive stretching, and toying with objects (e.g., flipping a piece of paper up and down with his pencil). Lucas did not enter school until he was 6 years old, and he was retained in the fourth/fifth-grade classroom at the request of his parents, so he was older than the other students.

Won was a 10-year-old Asian boy identified as having a learning disability and attention-deficit/hyperactivity disorder (ADHD). Won exhibited high rates of actively disengaged behavior during independent seatwork, including having heated verbal arguments with peers, persistently being out of his seat, wandering the halls for extended periods of time, talking, drawing, and singing.

Buck was an 11-year-old Caucasian boy identified as having a learning disability. Buck was disengaged passively during independent seatwork, characterized by nonstop drawing and doodling, talking to peers, staring at paper with head in hands, and occasionally humming to self.

Bill was a 13-year-old Caucasian boy identified as developmentally delayed with speech and language impairments. Intermittently, Bill’s active and passive disengagements during independent seatwork included acting aggressively toward peers (e.g., hitting, throwing spitballs, launching rubber bands), loud talking and laughing, staring at or instigating disagreements between peers, drawing, and being out of his seat. Bill vacillated between being productive and unproductive during math seatwork, with no obvious pattern evident. Like Lucas in the first demonstration, Bill did not enter school until he was 6 years old, and he was retained in the fourth/fifth-grade classroom at the request of his parents, thus his relatively older age.

Danielle was a 7-year-old Caucasian girl who was not identified as having a disability. Her chronic disengagement was active and often disrupted the other students in the classroom during math and reading independent seat-work. Danielle's disengaged behaviors included arguing with peers, talking, toying with objects, whining to the teacher, and persistently tattling on peers.

Chris was an 8-year-old boy identified as having ADHD. During the study, Chris received behavioral change medication to control the symptoms of ADHD. Chris was actively disengaged during math and reading independent seatwork. His actively disengaged behaviors consisted of persistently being out of his seat, wandering the halls, talking loudly with other students, constantly interrupting the master teacher to ask unrelated questions, and making in-appropriate remarks to peers.

Anna was a 9-year-old Caucasian girl who was not identified as having a disability. Anna was disengaged actively and passively during independent seatwork. Her actively disengaged behaviors included acting aggressively toward peers (e.g., gently tapping/hitting peers), talking and laughing, playing with same-gender peers' hair, and interrupting the master teacher with unrelated questions. By contrast, her passively disengaged behaviors were characterized by staring and being out of her seat. Anna vacillated between being productive and unproductive, although she was more likely to disengage during math independent seatwork than during reading.

Systematic behavioral observations indicated that all students were chronically disengaged during independent seatwork more than 45% of the time. The nine students were divided into three groups for purposes of the study. Table 1 summarizes the student characteristics and their groups. None of the students had previous experience with self-monitoring interventions.

Written parental consent and student assent for participation was obtained for each student. With the exception of John, the students received no rewards or incentives for participating in the study. John refused to participate in the study unless he received rewards. An agreement was reached whereby John could earn gel pens and mechanical pencils on achieving his self-monitoring goals for 3 consecutive days during Intervention 1 and for 5 consecutive days during Intervention 2.

Table 1. Student Characteristics Related to Age, Ethnicity, Grade, Accelerated Math Level, and Exceptionality Category

Group and student	Age (yrs.)	Ethnicity	Grade	Math grade level	Category of exceptionality
1					
John	11	Caucasian	5	5	Asperger syndrome
Mason	9	Caucasian	4	8	Gifted and talented
Lucas	13	Caucasian	5	3	Floating Harbor syndrome and speech/language impairment
2					
Won	10	Asian	4	3	Learning disabled and attention-deficit/hyperactivity disorder
Buck	11	Caucasian	5	3	Learning disabled
Bill	13	Caucasian	5	3	Learning disabled and speech/language impaired
3					
Danielle	7	Caucasian	2	2	Typically developing
Chris	8	Caucasian	2	3	Attention-deficit/hyperactivity disorder
Anna	9	Caucasian	2	3	Typically developing

SETTING

The study was conducted in an elementary school in the southern United States. John, Mason, and Lucas (Group 1), along with Won, Buck, and Bill (Group 2), were placed in the same fourth/fifth-grade multiage general education classroom, which served 22 students. Danielle, Chris, and Anna's (Group 3) general education classroom (i.e., second/ third-grade multiage setting) was located across the hallway from the older students and contained 21 students. The research was conducted when students were engaged in independent seatwork in the area of math for Groups 1 and 2 and math and reading for Group 3. In both classrooms, there was one master teacher and one assistant teacher. The master teacher was stationed at the computer. Her role was to guide students' interaction with the Accelerated Math curriculum program (e.g., scanning, scoring, printing new work material), while the assistant teacher worked with students individually on an as-needed basis. When Group 3 members were engaged in silent sustained reading with an Accelerated Reading book of their choice, the teachers circulated among the students, conducting informal comprehension checks. The two classrooms were fully inclusive and were multiage clusters; therefore, students differed in age and grade. The physical size of the classrooms was limited, forcing the students to be in close proximity to one another. There were no individual desks contained in either classroom; therefore, all students completed independent seatwork at square or round tables.

MATERIALS

The students used a graphic organizer (i.e., three-main-idea frame; Ellis, 1998); a timing device (a travel alarm clock with a snooze feature, a personal watch with an alarm function, an egg timer, or the classroom clock mounted on the wall); a self-monitoring think sheet (Groups 1 and 2) or a self-monitoring booklet (Group 3); a recording instrument (i.e., a pencil, pen, or overhead marker pen); and instructional materials specific to independent seatwork (e.g., Accelerated Math worksheet, scan cards, Accelerated Reader book).

The self-monitoring think sheet and booklets included academic performance goal statement prompts (e.g., "My math goal today is to complete 15 problems and scan"), academic attention (e.g., "Am I staying focused and working like I am in these pictures?"), and performance goal evaluation prompts (e.g., "How many math problems did I complete?"). Five-min self-recording intervals of attention and 30- or 45-min self-recording intervals of performance were incorporated to systematically teach students to keep a record of their behavioral and academic progress. Also, the sheets/booklets included individualized pictorial prompts (e.g., math and reading photographs depicting the student engaging in on-task behavior) to offer students concrete visual cues representing their attention-related goals. The self-monitoring booklet used by the younger students (Group 3) was laminated, easily assembled by hand, and reusable. The self-monitoring think sheet used by the older students (Groups 1 and 2) was generated by the computer using Microsoft Word and was reproducible (see Rock, 2004, for an example).

DESIGN

A multiple-baseline-across-subjects design with an embedded reversal (Kazdin, 1982) was used to evaluate the effectiveness of the ACT-REACT strategy on students' academic engagement, nontargeted problem behavior, productivity, and accuracy. For each student, academic engagement or disengagement, productivity, and accuracy data were obtained over the course of the analysis. The same design was used for Groups 1, 2, and 3.

DEPENDENT VARIABLES AND MEASUREMENT

Academic disengagement data (recording time off task) were collected for Group 1 (John, Mason, and Lucas). Academic disengagement was defined as a student not participating in math-related independent seatwork assignments (e.g., student not in seat or not working quietly on paper-and-pencil math task) and was recorded using frequency counts. Specifically, the observer recorded a tally mark each time a student was disengaged during the 45-min time allotted for independent math seatwork. In addition to the tally mark, the recorders noted the type of disengaged behavior observed to calculate the frequency of non-targeted problem behavior for each student (e.g., talking, call out, out of seat). If the student's disengaged behavior lasted more than 1 min, another occurrence of off-task behavior was recorded by tally and type. The frequency data for each student were then converted to rate data by dividing the frequency of academically disengaged behaviors by the number of minutes observed each day (Kazdin, 1982).

Academic engagement data (time on task) was recorded for Groups 2 and 3. Academic engagement was defined as a student participating in reading- or math-related assignments (e.g., student in seat, working quietly on paper-and-pencil math task). A momentary time-sampling strategy was used in which observers recorded whether the student was engaged or disengaged at the end of each 1 -min interval. If the recorder noted disengagement, he or she also identified the specific act of student disengagement to measure nontargeted problem behaviors (e.g., arguing with peer, wandering the hall, staring).

Systematic observations were conducted daily through-out each math or reading period from 1:30 p.m. until 2:15 p.m. for Groups 1 and 2 and from 11:00 a.m. until 12:00 p.m. for Group 3. Important to note is that the 1-

hr time block for Group 3 was divided into the following segments: 30 min for independent math seatwork and 30 min for silent sustained independent reading; whereas Groups 1 and 2 engaged in math independent seatwork continuously for 45 min.

In addition to engagement/disengagement and non-targeted problem behavior, math productivity and accuracy data were collected. Productivity and accuracy data were not collected during reading because of the varied curriculum and measurement difficulties (e.g., silent reading). Math productivity was defined as the total number of math problems completed each day, and math accuracy was defined as the percentage of the total number of completed problems that were correct. These academically specific variables were measured using permanent product analysis (e.g., computer-scored assignment and test results).

The school used the Accelerated Math curriculum, which is produced by Renaissance Learning. Accelerated Math is a computer software tool for managing and monitoring students' mathematics learning from first grade through calculus. Specifically, Accelerated Math generates unlimited practice assignments that are individualized for each student; provides immediate, individualized feedback showing what mistake each student makes; delineates all the mastered objectives; and immediately scores all assignments and tests (e.g., Renaissance Learning: Better Data, Better Learning; http://www. renlearn.com/am). The computer-generated Accelerated Math results delineated the number of problems completed as well as the percent-age of accuracy for each student.

INTEROBSERVER AGREEMENT

The author and three graduate assistants conducted all observations. The author was well trained in the use of the frequency measurement systems and taught the graduate assistants how to collect academic and behavioral data over a 1-wk period using videotapes and classroom-based practice recording. All of the graduate students were trained until each student reached the .80 or better criterion.

Graduate assistants collected interobserver agreement (IOA) data during each phase of the study across the de-pendent variables. Disengagement and problem behavior agreement data were assessed by having the graduate assistants observe the students at the same time as the re-searcher. For Group 1, a frequency ratio formula was used to calculate interobserver agreement (Kazdin, 1982). The smaller tally total frequency was divided by the larger and multiplied by 100 to obtain a percentage (Kazdin, 1982). The IOA for academically disengaged behavior was 89% (range = 81%–94%), and for nontargeted, problem behavior it was 85.5% (range = 80%–89%). During the first demonstration group, IOA was assessed during 18% of the sessions. Academic IOA data were unnecessary because productivity and accuracy data were computer generated.

For Groups 2 and 3, a point-by-point agreement ratio was used to calculate IOA (Kazdin, 1982). Agreements of the observers at each 1-min interval were divided by the number of agreements plus disagreements and multiplied by 100 to obtain a percentage (Kazdin, 1982). The IOA for Demonstration Group 2's academically engaged behavior was 95% (range = 87%–100%) and nontargeted, problem behavior was 92.3% (range = 87%–98%). The IOA for Group 3's academically engaged behavior was 90.3% (range = 82%–98.5%), and for nontargeted, problem behavior it was 88.9% (range = 81.6%–88.9%). During the second and third demonstration groups, IOA was assessed during each phase of the study (i.e., 14% of the sessions). Academic IOA data were unnecessary for reasons stated previously.

PROCEDURES

Baseline

Throughout the study, sessions were conducted daily, with the exception of absences, field trips, or unplanned events. During data collection, the observer was seated on a stool or in a chair in the back of the classroom. Students worked independently on Accelerated Math seatwork or on reading assignments. The curriculum was individualized, and students were engaged in various stages of learning (i.e., acquisition, fluency, maintenance, generalization) during these activities. For instance, when a student passed a test, the next math printout included new material that the student had not encountered previously. Students were expected to raise their hand when they needed assistance or encountered new content. During baseline, no other procedures were in place.

Intervention

A strategic self-monitoring intervention approach, referred to as the ACT-REACT strategy (see Rock, in press), was used. ACT-REACT is a mnemonic device employed to rep-resent a six-step, combined SMA + SMP, self-monitoring strategy. The steps are Articulate your goals, Create a work plan, Take pictures, Reflect using self-talk, Evaluate your progress, and ACT again. This self-monitoring strategy was developed based on a thorough review of the literature in an effort to help chronically disengaged students self-manage their learning using critical strategies and skills during independent seatwork activities. Academic goal-orientation elements are embedded into the ACT-REACT self-monitoring process to promote SMP. In addition, students self-check at 5-min intervals to facilitate SMA.

A combined SMA + SMP approach was deemed necessary as well as appropriate for a number of reasons. First, participants received individualized instruction in math that was computer generated diagnostically to ensure appropriate content and difficulty level. Still, the students remained chronically disengaged. Second, because the cognitive and behavioral characteristics of the students in this study varied widely (unlike previous research), a more comprehensive self-monitoring approach was used to be responsive to their divergent needs. Third, some critics contend the use of SMA-only procedures can produce students who appear engaged but who remain academically poorly producing and underachieving (Reid, 1996); however, there is evidence to suggest that students prefer using SMA to SMP approaches (Reid & Harris, 1993). As a consequence, to enhance the student-friendly aspects of the ACT-REACT strategy and simultaneously improve academic performance, a combined SMA + SMP approach was implemented.

After the last day of the first baseline, an individual training session was conducted by the author to teach each student how to use the strategic ACT-REACT self-monitoring procedure. The training session lasted approximately 45 to 90 min. The time of the training sessions varied because of the age as well as the cognitive and behavioral needs of the individual students.

The researcher first asked the student to bring his or her reading and math materials to the library. While in the library, the researcher taught and modeled the six steps of the strategic ACT-REACT self-monitoring strategy (see Rock, in press). During Step 1, students were engaged in goal-setting and goal-attainment activities specific to attention and performance (e.g., “I will earn nine checks for staying focused during math and completing 15 problems”). Semantic representation and task analysis (i.e., Ready–Aim–Fire; see Rock, in press) were used to help students develop a thorough understanding of goal-related behaviors. Ready was the key word used to represent the tasks of preparing for independent math/reading seatwork (e.g., getting paper and pencil, printing individualized math assignment, obtaining a scan card), Aim was used to signify the behavioral aspects of remaining focused (e.g., remaining in the seat, quietly reading a specific number of pages or actively solving a specific number of math problems, thinking strategically), and Fire was used to characterize the act of completing the assigned activity (e.g., meeting productivity and attention goals, checking work for accuracy, scanning, self-praising). A three-main-idea frame (i.e., graphic organizer for Ready–Aim–Fire; Ellis, 1998; Ellis & Rock, 2001) was used to task analyze and teach students the hierarchical structure of the actions required for productive on-task behavior during independent seatwork. Ellis’s (1998) frames were used because of their whole-to-part, part-to-whole orientation. The completion of the three-main-idea frame occurred one time when the students were learning the ACT-REACT strategy.

Step 2 training focused on teaching students how to self-record attention and performance data during independent seatwork by using a self-monitoring work plan. Students selected the type of timing device they preferred to use. Several students in Groups 1 and 2 selected the travel alarm with a snooze feature as their timing device. To avoid multiple alarms ringing in the classroom simultaneously, one alarm was used, and its control was rotated among the students on a day-to-day basis. Specifically, students were taught to monitor their attention or engaged academic behavior (SMA) by comparing it to their photograph (see Step 3), which depicted on-task behavior, once at the sound of the timer (every 5 min). If their present behavior (i.e., their real behavior) resembled their photographed behavior (i.e., their ideal behavior), the students were instructed to record a check mark on their self-monitoring think sheet or booklet. If the opposite occurred, they were instructed to either leave the self-monitoring box blank or record a check mark in the column marked “no.” Also, students were taught to self-monitor their performance (SMP) by recording the number of problems completed/pages read on the think sheet or booklet at the end of each 5-min interval.

Explicit modeling occurred in Step 3. Visual representations were used to model attention and performance goals established in Step 1 and to help students differentiate between on-task versus off-task behaviors as well as productive versus unproductive behaviors during self-recording. This visual representation of goals was created through a series of personalized student pictures. When the students were introduced to the strategy, photos were taken of each student posing in positions that reflected their academic and performance goals related to math or reading. For example, as Ready–Aim–Fire was the semantic representation used in Step 1 to teach goal-related behaviors, pictures were taken of the students gathering the necessary math or reading materials, staying focused on the assigned task, and completing the assignment success-fully to help students create positive and concrete mental representations of the steps needed to achieve their goals. The pictures were scanned into the computer and inserted into the student’s individualized self-monitoring think sheet or booklet to serve as continuous visual prompts.

All students were taught to continuously reflect on attention and performance goals, using self-talk, in Step 4. Students were taught to use reflective self-talk at each 5-min recording interval. For example, “I didn’t earn a check or complete any problems because I am zoning out! I need to look like I do in the picture. I have my materials so I’m ready, but I need to think about math and keep my pencil moving (aim and fire) to get rockin’. If I do this, I can meet my goals.” Students were instructed to use the se-mantic and visual representations of their goals to guide their reflective self-talk.

The fifth step of the training focused on teaching students to evaluate their overall attention and performance (SMA + SMP) during independent seatwork by determining whether or not they had successfully achieved their goals. Students were instructed to compare their performance at the end of each seatwork session with the goals they established at the beginning. For instance, if a student indicated that he or she intended to complete 15 math problems with 85% or better accuracy and he or she met that goal by the end of the period, he or she checked “yes” and recorded the productivity/accuracy numerically on the self-monitoring think sheet or booklet. Students followed the same procedure for evaluating their attention-related goal. All goal-evaluation recordings were completed on the self-monitoring think sheet/booklet. The computer printout each student received after scanning verified productivity/accuracy data.

The final phase of ACT-REACT training helped students understand that the technique or use of the strategy was recursive. Students were instructed that they were expected to use ACT-REACT continuously, rather than intermittently (every day as opposed to when they felt like it), for it to become a habit of mind. Also stressed during this step was the idea that the ACT-REACT steps are not mutually exclusive, but instead, all the steps support one another to facilitate the attainment of the student’s attention- and performance-related goals.

Intervention commenced on completion of baseline and training activities. Specifically, at the beginning of the math/reading period, ACT-REACT self-monitoring think sheets (Groups 1 and 2) and booklets (Group 3) were distributed, along with preferred timing devices, to the students. Also, the students were instructed to remember to use the ACT-REACT strategy they learned during training. This process took approximately 3 to 5 min. At the end of the session, the researcher reviewed the students’ goals, as well as their attention and performance data, with the students in a one-to-one format; encouraged the students to continue to monitor their attention and performance in other classes throughout the day; and collected the students’ ACT-REACT think sheets or booklets and timing devices. These wrap-up procedures took approximately 1 to 3 min.

Return to Baseline

Following the first phase of intervention, a second baseline phase occurred in which the students were instructed to take a break and not use the ACT-REACT procedures for 3 (Group 1) or 5 (Groups 2 and 3) consecutive school days. The researcher employed the same procedures as the initial baseline phase.

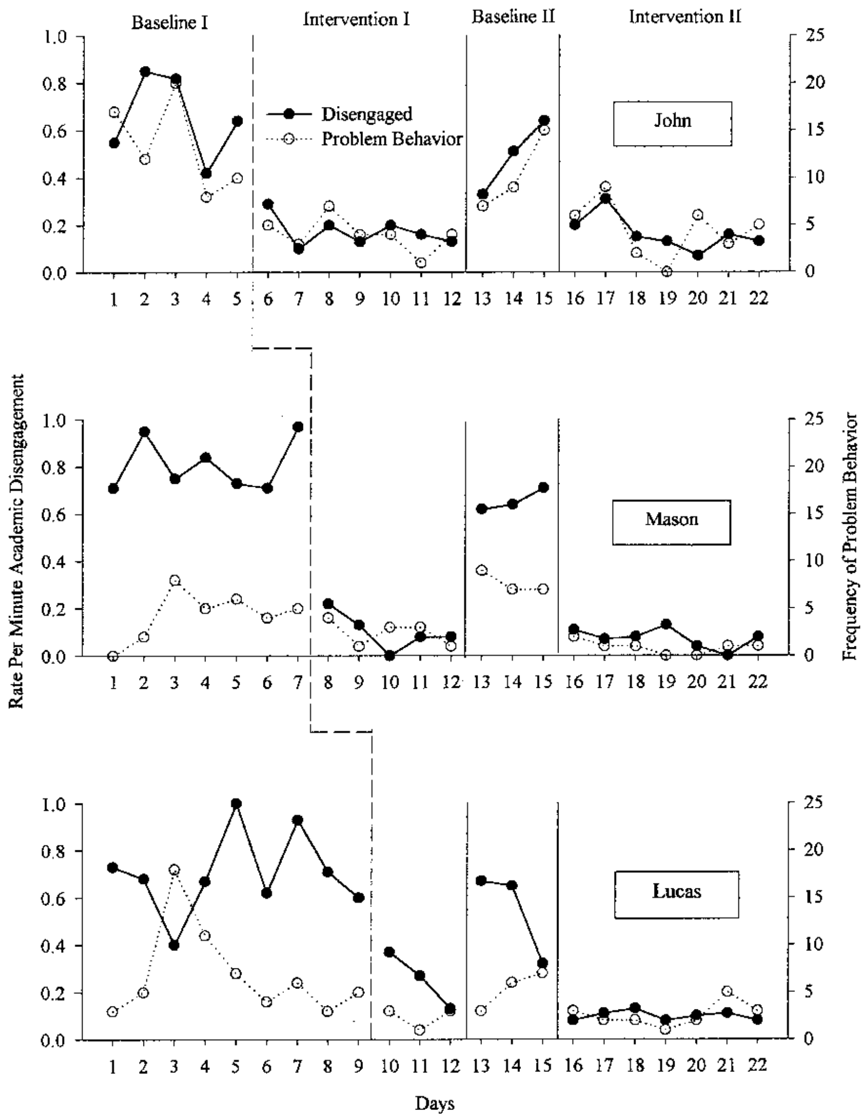

Figure 1. Rate of academic disengagement and frequency of problem behaviors for John, Mason, and Lucas during math independent seatwork.

Intervention 2

The strategic ACT-REACT self-monitoring intervention was reintroduced to the students after the last day of the return-to-baseline condition was completed. The ACT-REACT strategy was reviewed briefly (i.e., each of the six steps was modeled and demonstrated) with each student before reinstating the intervention phase.

Results

Figure 1 shows the rate of disengaged data for each student in Group 1. The data paths for these three students during the initial baseline are variable, although all three students demonstrated high levels of academic disengagement during math independent seatwork activities. The mean rate per minute of disengagement during baseline for John, Mason, and Lucas was .66 (range = 0.42–0.85), 0.81 (range = 0.71–0.897), and 0.74 (range = 0.40–1.0), respectively. During Intervention 1, when students were using the ACT-REACT strategy, the rate of the three students' disengaged behaviors decreased to low and steady rates. John's mean rate per minute of disengagement decreased to 0. 17 (range = 0. 10–0.29), Mason's to 0. 10 (range = 0.0–0.22), and Lucas's to 0.26 (range = 0.13–0.37). When the return-to-baseline condition was implemented, a substantial increase occurred to near-original baseline conditions. John's mean rate per minute of disengagement increased to 0.49 (range = 0.33–0.64), Mason's to 0.66 (range = 0.62–0.71), and Lucas's to 0.55 (range = 0.32–0.67). During the reinstatement of the ACT-REACT intervention phase of the study, the disengaged data paths for each student decelerated to low levels and remained constant. The mean rate per minute of John's seven data points during Intervention 2 was 0.16 (range = 0.07–0.31), Mason's was 0.07 (range = 0.0–0. 13), and Lucas's was 0. 1 (range = 0.08–0. 11).

Also, Figure 1 illustrates the frequency of problem behavior for each student in Group 1. The mean frequency of nontargeted problem behaviors that occurred during base-line for John, Mason, and Lucas was 13.4 (range = 8.0–20.0), 4.3 (range = 0.0–8.0), and 6.9 (range = 3.0–18.0), respectively. During Intervention 1, the frequency of the three students' problem behaviors decreased. John's mean number of call-outs decreased to 4.0 (range = 1.0–7.0), Mason's talking decreased to 2.4 (range = 1.0–4.0), and Lucas's staring decreased to 2.3 (range = 1.0–3.0). When the return-to-baseline condition was implemented, an increase in problem behaviors occurred. John's number of call-outs increased to 10.3 (range = 7.0–15.0), Mason's talking increased to 7.7 (range = 7.0–9.0), and Lucas's staring increased to 5.3 (range = 3.0–7.0). During the re-instatement of intervention, the problem behavior data paths for each student decelerated to a mean number for John of 4.4 (range = 0.0–9.0), Mason 0.9 (range = 0.0–2.0), and Lucas 2.6 (range = 1.0–5.0).

Table 2 provides the academic productivity and accuracy data for each student in Group 1. During Intervention 1, their academic productivity improved, although accuracy did not. When the return-to-baseline condition was implemented, decreases occurred in two of the three students' academic productivity, and accuracy increased or remained constant for all the students. During Intervention 2, the productivity data for each student in Group 1 improved, whereas the percentage of accuracy did not.

Figure 2 shows the percentage of academically en-gaged data for each student in Group 2. The data paths for two of the three students in Group 2 were stable and low during the initial baseline, and one student's was variable, with a downward trend. The mean percentages of engagement during the initial baseline for Won, Buck, and Bill were 4.6% (range = 0.0%– 11. 1%), 4.27% (range = 0.00%– 16.0%), and 47.42% (range = 2.0%–88.5%), respectively. During Intervention 1, the percentage of the three students' academically engaged behaviors increased to high and stable levels. Won's mean percentage of engagement increased to 84.44% (range = 75.0%–93.0%), Buck's to 84.63% (range = 63.3%–95.0%), and Bill's to 91.70% (range = 90.0%–93.3%). When the return-to-baseline condition was implemented, a substantial decrease occurred in the students' academically engaged behaviors. Won's mean percentage of engagement decreased to 47.6% (range = 13.0%–8 1.0%), Buck's to 34.38% (range = 20.0%–7 1.0%), and Bill's to 51.4% (range = 12.5%–78.0%). During the re-instatement of the ACT-REACT intervention, engagement data accelerated to high levels and remained constant. The mean percentage of Won's five data points during Intervention 2 was 86.3% (range = 80.0%–90.0%), Buck's was 81.5% (range = 73.3%–91.4%), and Bill's was 90.18% (range = 72.1%–93.3%).

Table 2. Demonstration Group 1 Academic Productivity and Accuracy: Accelerated Math Data

	Baseline 1		Intervention 1		Baseline 2		Intervention 2	
Group and student	Problems *n* (*M*)	Accuracy (%)	Problems *n* (*M*)	Accuracy (%)	Problems *n* (*M*)	Accuracy (%)	Problems *n* (*M*)	Accuracy (%)
1								
John	14.6	81	20.9	80[a]	23.7	86	20.7	77[a]
Mason	6.9	91	19.6	67[a]	17	81	20.6	80[a]
Lucas	7	85.66	10	71[a]	7.3	69[a]	12.2	84
2								
Won	0	0	13.1	67[a]	13.8	80	19	90[a]
Buck	3.3	69	20	72[a]	11	77	19.8	74[a]
Bill	7.8	69	8	60[a]	11.3	84	9.75	45[a]
3								
Danielle	8.7	94	19.3	93[a]	9.5	88	23.2	94[a]
Chris	10.8	83	20.1	84[a]	8.6	94	13.2	94
Anna	11.8	84	8.3	84[a]	19	95	18.4	63[a]

[a]Indicates that the student was introduced to new mathematical concepts.

Also, Figure 2 illustrates the percentage of problem behaviors for each student in Group 2. The mean percentages of problem behaviors during baseline for Won, Buck, and Bill were 16.3% (range = 13.3%–36.1%), 14.53% (range = 0.00%–48.15%), and 17.7% (range = 0.0%–51.4%), respectively. During Intervention 1, the percentage of the three students' problem behaviors decreased. Won's mean percentage of out-of-seat behavior decreased to 4.3% (range = 0.0%–23.3%), Buck's drawing decreased to .25% (range = 0.0%–3.3%), and Bill's talking decreased to 0.0% (range = 0.0%–0.0%). On return to baseline, an increase in the students' problem behaviors occurred. Won's mean percentage increased to 14.5% (range = 2.4%–48.4%), Buck's increased to 39.55% (range = 32.5%–47.5%), and Bill's increased to 17.0% (range = 11.9%–27.5%). During the reinstatement of the ACT-REACT, problem behavior decelerated to lower levels and remained relatively constant. The mean percentage for Won was 2.4% (range = 0.0%–6.7%), Buck 0.0% (range = 0.0%–0.0%), and Bill 4.0% (range = 0.0%–10.0%).

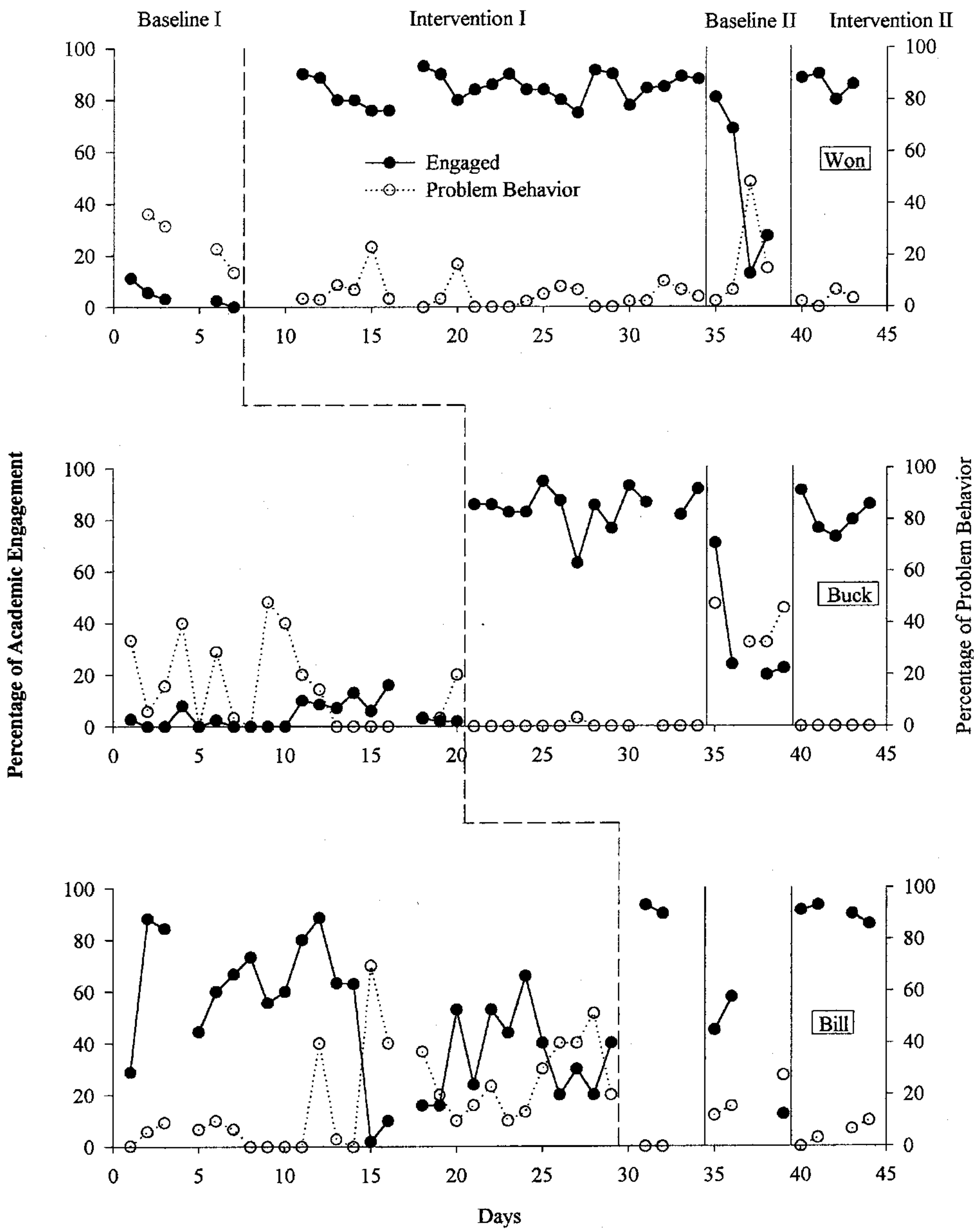

Figure 2. Percentage of observations with academic engagement and problem behaviors for Won, Buck, and Bill during math independent seatwork.

Table 2 provides the academic productivity and accuracy data for each student in Group 2. During the first baseline condition, Won completed no assigned math problems, and Buck's and Bill's accuracy was moderate. During Intervention 1, all of the students' academic productivity improved, although accuracy did not in one of the three. On return to baseline conditions, increases occurred in Won's academic productivity and accuracy. Buck's productivity declined, but his accuracy improved slightly, whereas Bill's productivity and accuracy improved. During the 5-day reinstatement of the ACT-REACT, the productivity and accuracy data for Won improved. Buck's productivity improved, but his accuracy declined slightly, whereas both Bill's productivity and his accuracy deteriorated.

Figure 3 shows the percentage of academically engaged data for each student in Group 3. The data paths for these three students during the initial baseline are variable, although all three students demonstrated low levels of academic engagement during math independent seatwork activities. The mean percentages of engagement during the initial baseline for Danielle, Chris, and Anna were 37.4% (range = 4.5%–66%), 34.19% (range = 8%–57%), and 54.46% (range = 14.5%–88.6%), respectively. During Intervention 1, the percentage of the three students' engaged behaviors increased to high and stable levels. Danielle's mean percentage of engagement increased to 88. 1 % (range = 75.9%–100%), Chris's to 86.74% (range = 64.6%–100%), and Anna's to 88. 1 % (range = 64%–100%). During return to baseline, substantial decrease occurred in the students' engaged behaviors. Danielle's mean percentage of engagement decreased to 57.81% (range = 39.8%–65.5%), Chris's to 46.4% (range = 29%–36.5%), and Anna's to 46.8% (range = 19.3%–83%). During the reinstatement of the ACT-REACT intervention phase of the study, the engaged data paths for each student in Group 1 accelerated to high levels and remained constant. The mean percentage of Danielle's six data points during Intervention 2 was 91.0% (range = 85%–96.1%), Chris's was 89.8% (range = 84%– 96.8%), and Anna's was 90.65% (range = 84%–95%).

Figure 3 also illustrates the percentage of problem behavior for each student in Group 3. The mean percentages of problem behavior for Danielle, Chris, and Anna were 20.2% (range = 8%–43.3%), 22.9% (range = 6%–63%), and 13.8% (range = 0%–45.7%), respectively. During Intervention 1, the percentage of the three students' problem behaviors decreased. Danielle's mean percentage of problem behavior decreased to 2.6% (range = 0%–8.7%), Chris's to 10.1% (range = 2.2%–26.6%), and Anna's to 6.2% (range = 2.5%–17.4%). On return to baseline, an increase occurred in the students' problem behaviors. Danielle's mean percentage of talking behavior increased to 14.6% (range = 7.5%–23.4%), Chris's out-of-seat behavior in-creased to 16.2% (range = 8.9%–27.9%), and Anna's talking behavior increased to 38.6% (range = 10.6%–63.3%). During the reinstatement of the ACT-REACT, the problem behavior data paths for each student in Group 2 decelerated to lower levels and remained relatively constant. The mean percentage of Danielle's talking behavior during Intervention 2 was 6.2% (range = 4%–12.5%), Chris's out-of-seat behavior was 4.5% (range = 0%–8.9%), and Anna's talking behavior was 6.9% (range = 2.5%–16%).

Table 2 provides the academic productivity and accuracy data for each student in Group 3. During the 7, 18, and 28 days of the first baseline condition, Danielle, Chris, and Anna completed a low to moderate number of assigned math problems with adequate accuracy. During Intervention 1, when students were using the ACT-REACT strategy, their academic productivity improved and their accuracy remained stable. When the return-to-baseline condition was implemented, decreases occurred in Danielle's productivity and accuracy. Chris's productivity declined, while his accuracy improved. Both productivity and accuracy improved for Anna. During the 5-day reinstatement of the ACT-REACT, the productivity and accuracy data for two of the three students in Group 3 improved or remained constant, although for one student both declined.

Discussion

A number of researchers (Koegel, Harrower, & Koegel, 1999; Levendoski & Cartledge, 2000) have called for studies that validate effective procedures to successfully support the full inclusion of students with exceptionalities who receive their educational services within the context of general education classroom settings. This study was responsive to this need, and its results are instructive in a number of ways. Overall, the results of this study indicate that the strategic ACT-REACT self-monitoring intervention was an effective procedure for increasing academic engagement and productivity, as well as for maintaining accuracy in students with and without exceptionalities in inclusive classrooms.

In terms of increased academic engagement and productivity, the aforementioned results are consistent with the findings of Levendoski and Cartledge (2000). These researchers used self-monitoring tactics in a self-contained classroom with students with behavior disorders to improve the students' academic engagement and productivity during math independent seatwork with work they had not yet mastered. Similar to Levendoski and Cartledge's findings, the students' engagement and productivity in this study also improved across new versus previously learned material, but for some students their accuracy did not. In the first demonstration group, none of the three participants improved their academic accuracy by the end of the study. This may be a direct result of the variations in the students' stages of learning. For instance, during the initial baseline condition, John's accuracy was adequate, because he was completing work at the maintenance level (e.g., addition, subtraction, multiplication of multiple digits with regrouping). However, during the first phase of intervention, his accuracy decreased, not because he was working too quickly and making careless errors but because during this time he was introduced to adding and subtracting fractions/mixed numerals. At return to baseline, John had moved beyond the acquisition phase into fluency, so his accuracy improved. Finally, during the second intervention condition, when John was introduced to multiplying and dividing fractions/mixed numerals, his accuracy plummeted. Similar patterns were observed with Mason and Lucas (see Table 2).

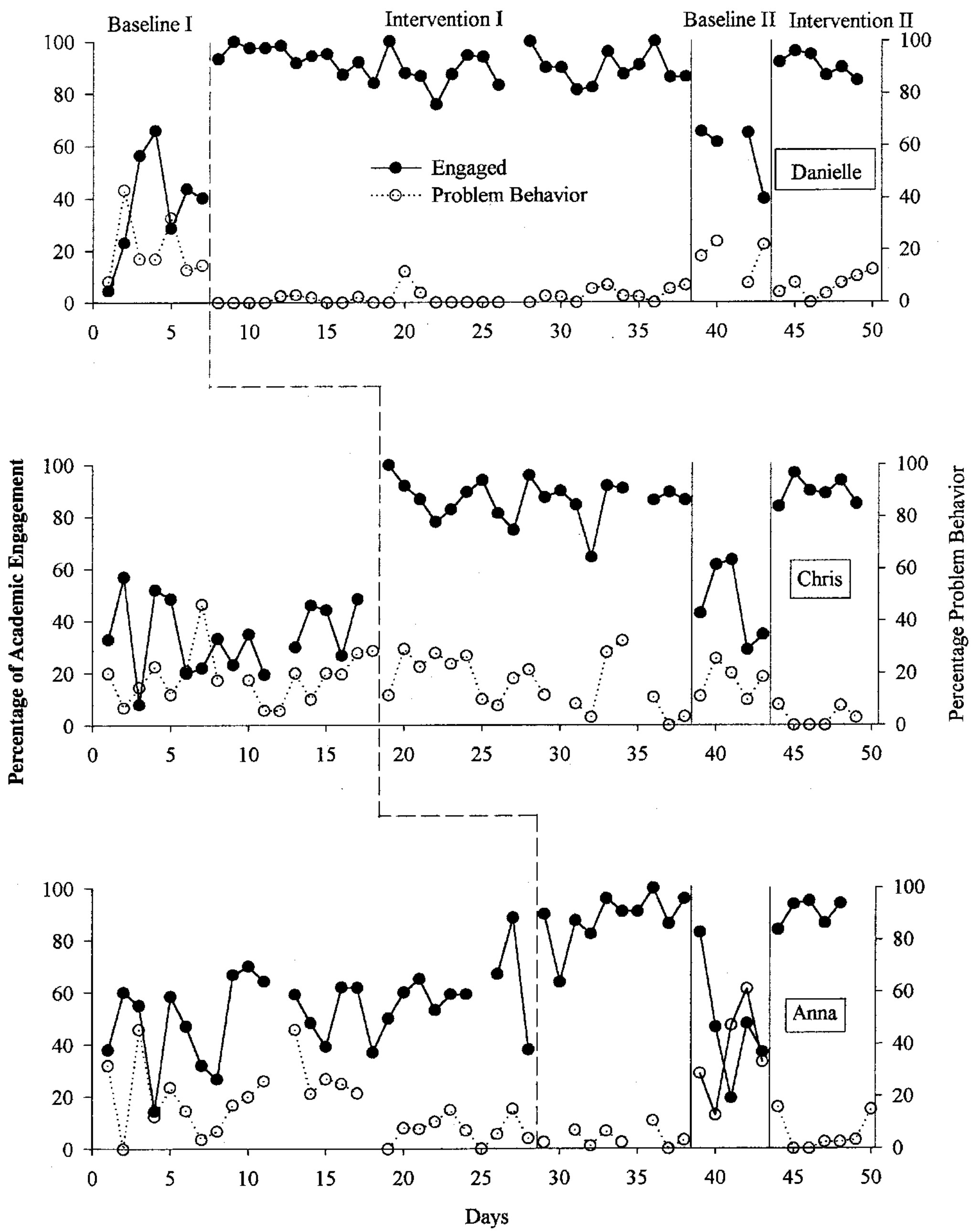

Figure 3. Percentage of observations with academic engagement and problem behaviors for Danielle, Chris, and Anna during math independent seatwork and silent sustained reading.

In Groups 2 and 3, the majority of the students did maintain or improve their academic accuracy. Explanations for this difference between the demonstration groups are not easily forthcoming, but in part it may be a result of the second and third demonstrations being twice as long as the first. This expanded time frame may have afforded students in Groups 2 and 3 greater opportunity to acquire newly learned math skills, move through the later stages of learning, and ultimately demonstrate lasting competence. An examination of within-condition trends for each group supported this idea.

The improvements in the students' academic and behavioral performance may be attributed in part to the notion that they self-monitored multiple target behaviors related to academic engagement and productivity. Carr and Punzo (1993) asserted that monitoring of academic performance has a slight advantage over monitoring of behavior, and Rooney, Polloway, and Hallahan (1985) also posited that focusing students' attention on a combination of types of target behavior (e.g., productivity and accuracy) seems to be more effective than concentrating on a single one. The ACT-REACT strategy does incorporate concurrent use of SMA + SMP procedures that require students to interrupt themselves every 5 min to assess their on-task behavior (SMA) and also to measure precisely their academic productivity/accuracy (SMP) at the end of each work period. However, a limitation is that this study did not attempt to determine which of these assessment procedures was the most effective. Future research might conduct such an analysis.

Moreover, the observed improvements in academic engagement and productivity may be attributable to high-choice conditions. A number of researchers (Carr & Punzo, 1993; Dunlap et al., 1994; Osborne, Kosiewicz, Crumley, & Lee, 1987) ascertained that academic and behavioral performance is enhanced when students are active participants in the change process. Students using ACT-REACT established and measured their self-monitoring goals, thereby exercising choice and executing decision-making skills each day.

Yet another vitally important variable that may be associated with the success of the ACT-REACT strategy is self-modeling. Since the 1970s, researchers have documented the effectiveness of self-modeling procedures using videotape or photographs of students engaging in desired behaviors (e.g., Dorwick & Hood, 198 1; Hosford & Brown, 1976; Schunk & Hanson, 1989). Also, McCurdy and Shapiro (1988) and Schunk and Hanson (1989) compared peer modeling to self-modeling and found equivalent or better results. ACT-REACT employs the use of picture self-modeling as an SMA prompt, as well as a visual representation of the student's short-term behavioral goal, for this reason. Future research may determine the salience of the self-modeling component of ACT-REACT by systematically conducting a multitreatment comparison study.

Finally, findings indicate ACT-REACT is a robust self-monitoring strategy to enhance academic engagement and productivity while maintaining the accuracy of students with differing exceptionality labels in general education classrooms. This study indicates that students with differing needs/exceptionalities are likely to benefit from a single intervention, with slight variations to meet their idiosyncratic behavioral differences resulting from differing problem behaviors. Indeed, the participants in this study had differing labels, including Asperger syndrome, giftedness, Floating Harbor syndrome, learning disabilities, ADHD, and so forth, yet they all benefited from using the ACT-REACT strategy.

There are limitations associated with this inquiry. This study of the effectiveness of ACT-REACT relied on the use of a nonconventional measurement system in the first of the three demonstrations. Frequency observations are not typically used to measure behaviors that are not discrete; this thus was a less sensitive measure of the students' academic disengagement. It is also important to note that for Groups 2 and 3, the measurement system was changed to a momentary time-sampling procedure, which reflected a more sensitive as well as conventional approach, and the results achieved with Group 1 were replicated. This seems to provide additional support for the outcomes achieved in this study.

The inclusion of rewards for one participant in Group 1 of the study (John) was a potential design confound in that his ACT-REACT intervention differed from that of the other eight students. Again, it is important to consider that the results were replicated with all of the other subjects who did not receive any type of extrinsic reward.

Also, much of the data were collected by the author/ researcher. This could reflect a potential bias, as the researcher was not naïve to the purposes or conditions of the study. Future studies will call for implementation of ACT-REACT on behalf of practicing teachers and data collection by naïve observers in an attempt to control for this variable.

Moreover, a fading condition was not included in this inquiry. A study that incorporates a gradual fading schedule is preferred. Another important consideration is that the complexity (SMA + SMP) of the strategic self-monitoring intervention may not have been necessary. Future research should evaluate simpler packages or use a component withdrawal design to "tease out" effective components of the ACT-REACT strategy.

These limitations not withstanding, the results are consistent with the substantial knowledge base in self-management and also contribute to the emerging literature on the provision of effective behavioral and academic supports for students with exceptionalities in inclusive classrooms. The ACT-REACT strategy used in this study included a variety of specific components (i.e., SMA + SMP) to improve students' academic engagement and productivity. Although this investigation did not identify which dimensions of ACT-REACT are the most salient, it did confirm that it is an effective strategy for fostering self-management and enhancing academic performance. Also, as the results of this investigation indicate that ACT-REACT works well with nondisabled students, general education teachers may be more responsive to its use. Moreover, ACT-REACT is aligned with the No Child Left Behind Act legislation, in that it is an evidence-based practice used strategically to improve all students' learning, and it also is in accord with IDEA 1997, in that the strategy offers educators an additional framework for the provision of positive behavioral supports to students with disabilities who receive their education in general education class-rooms.

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