

Using Self-Monitoring to Increase Following-Direction Skills of Students with Moderate to Severe Disabilities in General Education

Martin Agran
University of Northern Iowa

Thomas Sinclair
Eastern Illinois University

Sandra Alper and Michael Cavin
University of Northern Iowa

Michael Wehmeyer
University of Kansas

Carolyn Hughes
Vanderbilt University

Abstract: We used two multiple baseline designs to investigate effects of a self-monitoring strategy on following-direction skills of six middle school students with moderate to severe disabilities in general education. Students were instructed to acknowledge a given direction, complete the task, and monitor their performance. Results suggest that all students learned the strategy and maintained their performance at mastery levels for the duration of the maintenance condition. Social validation data obtained from participating general and special educators supported these findings. Implications for promoting student-directed learning and inclusive education are discussed.

The value of promoting student-directed learning in general curriculum is receiving increased attention (Agran, King-Sears, Wehmeyer, & Copeland, 2003; Hughes et al., 2002; Wehmeyer, Sands, Knowlton, & Kozleski, 2002). Student-directed learning involves teaching students to use one or more self-directed instructional strategies to plan, perform, and monitor a learning task (Agran, 1997). These strategies occasion a shift from teacher-directed instruction to one that is more student-directed, thus providing students opportunities to direct and regulate their own learning. Specifically, the strategies

allow students to regulate their expectations about what they can learn and how much; make choices and decisions about how they will learn and in what sequence; and execute, monitor, and evaluate actions taken (Mithaug, Mithaug, Agran, Martin, & Wehmeyer, 2002). By using these strategies, dependence on external support is minimized, engagement and motivation are increased, and learning is maximized.

Although student-directed learning strategies continue to be underutilized (Agran, Snow, & Swaner, 1999; Wehmeyer, Agran, & Hughes, 2000), the positive effects of student-directed learning strategies for students with moderate to severe disabilities in general education have begun to be reported in the research literature. For example, Gilberts, Agran, Hughes, and Wehmeyer (2001) taught five middle school students with severe disabilities to monitor 11 classroom survival skills. All students were enrolled in a variety of general education content classes (e.g., Spanish, U.S. history). Among the target skills were asking and answering questions, greeting teachers and students, bringing appropriate materials to class, and acknowledging teacher com-

The study was completed by the second author during his Ed.D. Graduate degree program at the University of Northern Iowa. The study was supported in part by U.S. Department of Education grant #H023D9790502-98 awarded to Drs. Agran, Hughes, and Wehmeyer, and does not necessarily reflect the opinions of the Office of Special Education Programs. Correspondence concerning this article should be addressed to Martin Agran, Department of Special Education, 158 SEC, University of Northern Iowa, Cedar Falls, IA 50614-0601. E-mail: martin.agran@uni.edu

ments. Students were taught to indicate on a self-recording sheet if they performed each of the target skills. Positive changes were reported for all students. Also Copeland, Hughes, Agran, Wehmeyer, and Fowler (2002) taught four high school students, all of who were enrolled in cosmetology classes, to self-regulate their classroom performance. Specifically, students were taught to set learning goals for themselves, monitor if they performed targeted skills (i.e., correctly responded to worksheet assignments), and evaluate how well they did. Positive findings were reported for all students, with three of the four students receiving, in turn, higher report card grades. Additionally, Agran, Blanchard, Hughes, and Wehmeyer (2002) taught four middle school students with autism spectrum disorders, intellectual, or multiple disabilities to use a self-regulated problem-solving strategy, which involved setting goals for themselves, selecting a procedure to achieve the goal, implementing the strategy, and, last, evaluating their progress. Target behaviors included contributing more to class discussion, not touching other students inappropriately, and following directions. Dramatic increases were reported for all participants.

Watson and Tharp (1989) indicated that critical to a student's success in learning and task performance is the ability to self-regulate his or her own performance. Put simply, self-regulation refers to the means individuals use to adapt to circumstances (Mithaug, 1996). For a variety of reasons, individuals self-regulate to varying degrees of success, and it is this ability that will determine the extent to which an individual will achieve power and control of their lives (Mithaug, 1993). Because of devalued and marginalized perceptions of disability by society, highlighted by a belief that individuals with moderate to severe disabilities are incapable of regulating their own behavior (Wehmeyer et al., 2000), it is not surprising that students with disabilities remain dependent on others to direct their behavior. They have little experience in monitoring their own behavior and obtain information about the quality of their behavioral performance from others. Optimal gain is powered by an individual's discernment that a discrepancy exists between a current state (what he or she has) and a desired one (what he or she wants to have),

and it is this realization that fuels behavior change (Mithaug et al., 2002).

A self-regulation strategy of great utility for students with severe disabilities is self-monitoring. Self-monitoring involves a student's self-observation of a target behavior, followed by recording the occurrence. It can be used to record the frequency of occurrence of virtually any discrete behavior (Agran & Wehmeyer, 2002). As long as the target behavior can be discriminated and its occurrence can be recorded in some manner (e.g., paper and pencil tally, wrist counter), self-monitoring represents a strategy easily employed by students with severe disabilities (Agran, 1997).

A particular value of the strategy is its self-regulatory role in promoting behavior change. Baer (1984) suggested that self-monitoring produces behavior change because it serves as a discriminative stimulus and cues desired behavior. Self-monitoring allows the student to discriminate the target behavior and remind him or her of the present and future contingencies in the environment ("if I perform this response, this will happen") (Agran & Wehmeyer, 2002). With this information it is more likely that the behavior will occur. Most importantly, the increase will occur on the basis of what the student, rather than the teacher, does.

Although self-monitoring has been advocated as a particularly useful and potentially effective self-directed learning strategy (Agran, 1997; Hughes et al., 2002), reports of the effects of this strategy on the classroom performance of students with severe disabilities in general education remain limited. Further, although educators have acknowledged the value of self-monitoring, only a limited number of teachers systematically teach their students how to use the strategy (Agran et al., 1999; Wehmeyer et al., 2000). Self-monitoring, among other student-directed learning strategies, provides a potentially effective way to maximize the participation of students with severe disabilities in general education and to enhance their learning, and further study of its effects is warranted. The purpose of this study was to investigate the effects of self-monitoring instruction on the participation of six middle school students with moderate to severe disabilities in general education settings; specifically, the six students were instructed to

monitor their frequency of following directions.

Method

Participants and Setting

Six students were selected to participate in this investigation based on the following criteria: (1) identification consistent with state guidelines (Iowa) as having mental retardation in the moderate to severe range (Level III), (2) middle school grade placements of 7th or 8th, (3) current inclusion in general education classes as a part of their IEP's, and (4) teacher evaluation of need for improvement in following directions.

All participants attended a medium-sized midwestern junior high school serving approximately 350 7th and 8th graders. The school day was divided into seven 45 min periods with a 15 min homeroom at the end of the day. Five participants were included in exploratory classes (e.g., industrial technology, art, family consumer science) in which many specific directions were given to complete an activity; for example, "everybody take out your plans", "now measure the width between your front wheels," or "does it comply with our standards?" The sixth was included in a social studies class in which the teacher gave directions as he moved from one aspect of the class to the next; for example, "everybody please take out your notebooks," or "now working in pairs, I want you to answer the first five questions on the worksheet over Chapter 10."

Among the tasks in industrial technology were making scale drawings, manufacturing a CO2 powered racing car, and assisting in building a concession stand. In art, the students made pictures with different shapes, contrasting colors and varying hues. In family consumer science students prepared different types of foods (e.g., salads and desserts) and sewed at least one item of clothing or a stuffed animal or ball. Last, in social studies the students worked on maps of different regions, worksheets from the textbook, and mini-projects over different cultures.

All participants were male. One student was African American (WH), and the remaining five students were Caucasian. Ages ranged from 13 to 15 years. Full-scale WISC-III IQ

scores (Wechsler, 1991) ranged from 30 to 72, with a mean of 57. According to teacher reports, all participants were identified as having restrictive adaptive functioning in following directions. Two were diagnosed with autism, and one was assessed as having Aspergers Syndrome.

Participant characteristics are summarized in Table 1. JB was a 13-year-old adolescent who was in 7th grade. He demonstrated obsessive/compulsive behavior (e.g., repeatedly cleaning off tables) and was being assessed for Asperger's Syndrome. JB would fixate on a number of tasks, especially when cleaning was involved. For example, when asked to wipe off a table, he would clean the entire table over and over until he was stopped. JB was included in a home economics class. JB had a peer assistant walk with him to and from class in order to make sure he did not wander off to another part of the building.

JT was a 13-year-old male who was in 8th grade. He was mechanically inclined and enjoyed working with his hands putting things together or taking things apart. JT was included in an industrial technology class. Following directions was difficult for JT because he would not focus on the teacher. He was a popular young man who attended to his peers. His teacher indicated that he had great difficulty following directions.

WH was 15-years-old and in 8th grade. He had many athletic skills and participated in

TABLE 1
Participant Characteristics

<i>Student</i>	<i>Age/ Grade</i>	<i>IQ¹</i>	<i>Classification²</i>	<i>Level of Support³</i>
Group 1:				
JB	13/7 th	60	2	Limited
JT	13/8 th	55	2	Limited
WH	15/8 th	72	2	Intermittent
Group 2:				
CS	14/8 th	50	3	Extensive
GS	15/8 th	60	3	Extensive
AH	14/8 th	30	3	Pervasive

¹ Based on WISC-III.

² Based on local district requirements and using their support terminology (1 = least support, 3 = most support).

³ Based on AAMR Classification.

several sports. WH was resistant to asking for or accepting help and got angry and frustrated when tasks seemed too difficult for him. WH was included in social studies.

CS was 14-years-old and in 8th grade. He was a large young man and active in sports. CS did not follow directions well since he did not always understand what directions were given. He would not usually ask for clarification and either do the activity the way he thought it should be done or not do it at all. CS was included in an industrial technology class.

GS was a 15-year-old 8th grader. He was pleasant and well liked by his teachers and peers. GS was diagnosed with autism and delayed communication and interaction with others. GS rushed through things to get finished, whether or not he followed the directions and completed all the steps. As a result, his work was often inaccurate and incomplete. GS was included in an industrial technology class.

AH was a 14-year-old 8th grader diagnosed with autism. He was often off task and answered questions inappropriately. AH had difficulty following any directions that included more than a couple of steps. AH was included in an art class and had a full-time associate who accompanied him to class.

Dependent Variables

The primary dependent measure was amount of change in each student's performance of following directions. Observers recorded daily the behaviors participants demonstrated in following directions. These behaviors included acknowledging the person giving the direction, beginning the activity, and completing the activity. Performance data were calculated as the percentage of successfully completed steps of the task sequence. A minimum of five opportunities to follow directions were recorded within a given class period.

Prior to selection of the target behavior, typical peers were observed in the general education classes in which participants were included. Approximately 10 hours were spent observing these students. Students were observed making CO2 powered cars, sewing projects, completing worksheets and working in small group, developing complimentary color charts with paint based on teacher ad-

ministered directions, participating in group activities, and completing assignments.

Based on these activities, both general and special educators were asked what particular skills students had difficulty with. All teachers indicated that following directions was a skill difficult for several students. Following, the participants were shown a list of skills observed during performance of the above activities and asked to provide their input. All students agreed that they needed more practice in following directions.

Data Collection

Both the students and the observer recorded performance data; these data were based on students' performance of steps in the task analyses. Students self-monitored their performance during the intervention and maintenance conditions and the observer recorded their behaviors as they occurred during all three experimental conditions. Also, the researcher computed the agreement between the observer's and student's records of target behavior performance.

Interobserver agreement. Interobserver agreement scores were obtained for approximately 50% of the sessions throughout all experimental conditions. An independent observer and the researcher were responsible for data collection during the assessment across all sessions. The observer and the researcher scored each step of the task analysis, and then compared scores to determine degree of agreement.

A point-by-point agreement ratio was used to determine percentage of agreement between observers. Point-by-point agreement was established by dividing number of agreements by number of agreements and disagreements and multiplying by 100 (Kazdin, 1982).

Observer training. A university research assistant was hired as the observer across all conditions. The researcher served as an observer during times of interobserver agreement. Observer training consisted of two stages. First, each observer was instructed in use of Lovitt's (2000) self-management package. Instruction consisted of operationally defining the target behaviors and understanding the coding system. Second, observers role-played, identified, and recorded target behaviors of following directions in relating to key

instructional tasks. When the observers reached an 80% agreement on observed behaviors for three consecutive sessions, training ended and observation of participants in the general education classroom began.

Treatment fidelity. To ensure the appropriate and consistent delivery of the self-monitoring strategy instruction, the trainer followed an instructional checklist each session. The checklist consisted of steps the trainer used to instruct the student to follow directions and monitor their own performance. The checklist items were used to determine if the instructional protocol was consistently delivered in each session. The observer used the checklist to monitor approximately 25% of training sessions to ensure that the instruction was consistent.

Experimental Design and Conditions

A multiple-baseline design across subjects was used to assess effects of an instructional program designed to train students to follow directions in the general education classroom (Kazdin, 1982; Tawney & Gast, 1984). Because of logistical and scheduling contingencies, two parallel multiple baseline designs were conducted, each with three participants. The experimental conditions included: baseline, intervention, and maintenance. Each is described below.

Baseline. During this condition, the observer observed and recorded frequency of occurrence of each target behavior. A minimum of five directions was delivered during each observation session. If the teacher gave less than three directions (e.g., in a session when a video was played), the data were not included. No reinforcement or corrective feedback was provided during this condition. Intervention was initiated after a stable pattern of responding was observed.

Intervention. This involved teaching students to complete assigned tasks and self-monitor their performance. Students were instructed to make a "+" mark in a box on the self-monitoring sheet each time they performed a step in the task analysis, or a "-" in the box if a step in the task analysis was not completed. Students were instructed on what constituted an appropriate response involving following directions. These statements were printed on the self-monitoring sheet to corre-

spond with steps of the task analysis. During the period preceding the general education class, self-monitoring instruction was provided in the following manner.

First, the trainer clearly defined the target behavior of following directions given by their general education teacher. Students were instructed in what constitutes a direction and how to discriminate between a direction and other statements. Examples were provided to demonstrate a direction (e.g., "Please open your book to page 20 and answer the questions over the chapter") versus a statement (e.g., "My note book is missing"). The participant was then asked to generate two examples of directions that may occur in the general education classroom in which that participant participated. Second, the trainer explained the purpose of self-monitoring. The trainer introduced the self-monitoring form and discussed how the participating student responded to this form. The trainer then showed the participant the instrument and discussed the component responses of following directions. Steps included nodding the head or making a verbal affirmation, verbally restating the direction, performing the direction, and self-monitoring the behaviors performed. Next, the trainer demonstrated each step and self-monitored as he followed a direction. The trainer presented both exemplars (e.g., "begin to work after the teacher is done giving directions") and non-exemplars (e.g., "sitting at your desk and looking around after the direction is given") of following directions. The trainer acted out each step of following directions and demonstrated the use of the self-monitoring device after each step was completed.

Last, role-playing was conducted in which the student practicing following directions while the trainer delivered the directions. The trainer gave a direction and the participant acted out all responses of the target behavior and self-monitored while performing the direction and completing the task. For example, the student might be asked to open his book to a particular page, choose two opposing colors, or write down what a favorite meal. One non-exemplar was used to assist in the discrimination between directions and statements. For example, "I think that is a nice drawing," "I like the color red," or "I'm not very fond of tacos." Verbal reinforcement was delivered to

the participants when they demonstrated accurate use of the strategy. Corrective feedback was provided when a particular step was not completed correctly and the trainer demonstrated a correct response.

During training, the observer collected data on the students' use of self-monitoring and frequency of following directions in the general education class. Training continued until the student demonstrated mastery of the target by maintaining at least 80% correct responses of the target behavior.

Maintenance. After each participant demonstrated an 80% mastery criterion of self-monitoring direction following for three consecutive sessions, direct intervention was withdrawn. No further praise or feedback was delivered but the trainer continued to give students a self-monitoring card at the beginning of each class period if they had not brought the forms to class. Maintenance data were collected two times per week by the observer for one to three months following withdrawal of training. Time in maintenance depended upon the order in which students went through the intervention.

Results

Interobserver Agreement

Two agreement measures were calculated. First, a procedural reliability of 100% was calculated for the teaching procedure. The trainer followed all steps of the teaching procedure in all 25 sessions observed. Second, interobserver agreement scores were obtained for approximately 25% of the sessions across all of the experimental conditions. A point-by-point agreement ratio ranging 90 to 100%, with a mean of 95% was reported.

Student Performance

Figure 1 displays performance data across all conditions for students in Group 1. Performance data for students in Group 2 are displayed in Figure 2.

Group 1

Baseline. JB responded consistently at a low level of performance. JB performed between 7% and 11% of the steps, with a mean

of 9%. During nine baseline sessions, JT correctly completed between 10% and 20% of the steps for following directions, with a mean of 13% correctly completed steps. Last, WH correctly completed between 13% and 25% for 12 baseline sessions, with a mean of 23% correctly completed steps.

Intervention. During intervention, JB correctly completed between 33% and 100% of the steps of the task analysis for following directions, with a mean of 71% correctly completed steps. JB reached the criterion level of 80% after the fourth intervention session and maintained that level for three consecutive sessions. JT correctly completed between 28% and 84% of the sessions. JT performed at a mean level of 63%. JT reached the criterion level after the fifth intervention session and maintained that level for three consecutive sessions. Last, WH correctly completed between 60% and 92%, with mean of 77% correctly completed steps. WH reached the criterion level of 80% after the fourth intervention session and maintained that level for three consecutive sessions.

Maintenance. During maintenance, JB correctly completed between 96% and 100% of the steps, with a mean of 99%. Maintenance data were collected for two and one-half months. JT correctly completed between 72% and 96% of the steps of the task analysis, with a mean of 84%. JT was in maintenance for nine maintenance sessions over one and one-half months. Last, WH correctly completed between 88% and 100% of the steps directions for the five maintenance sessions, over one month. WH had a mean of 93% correctly completed steps.

Group 2

Baseline. CS consistently performed the target behavior at a low level of frequency. CS correctly completed between 7% and 14% of following directions responses, with a mean of 11% correctly completed steps. GS correctly completed between 11% and 20% of the steps, with a mean of 14%. Last, AH correctly completed between 4% and 40% of the steps with a mean of 15%.

Intervention. During intervention, CS correctly completed between 20% and 86% of the steps, with a mean of 55%. CS reached the

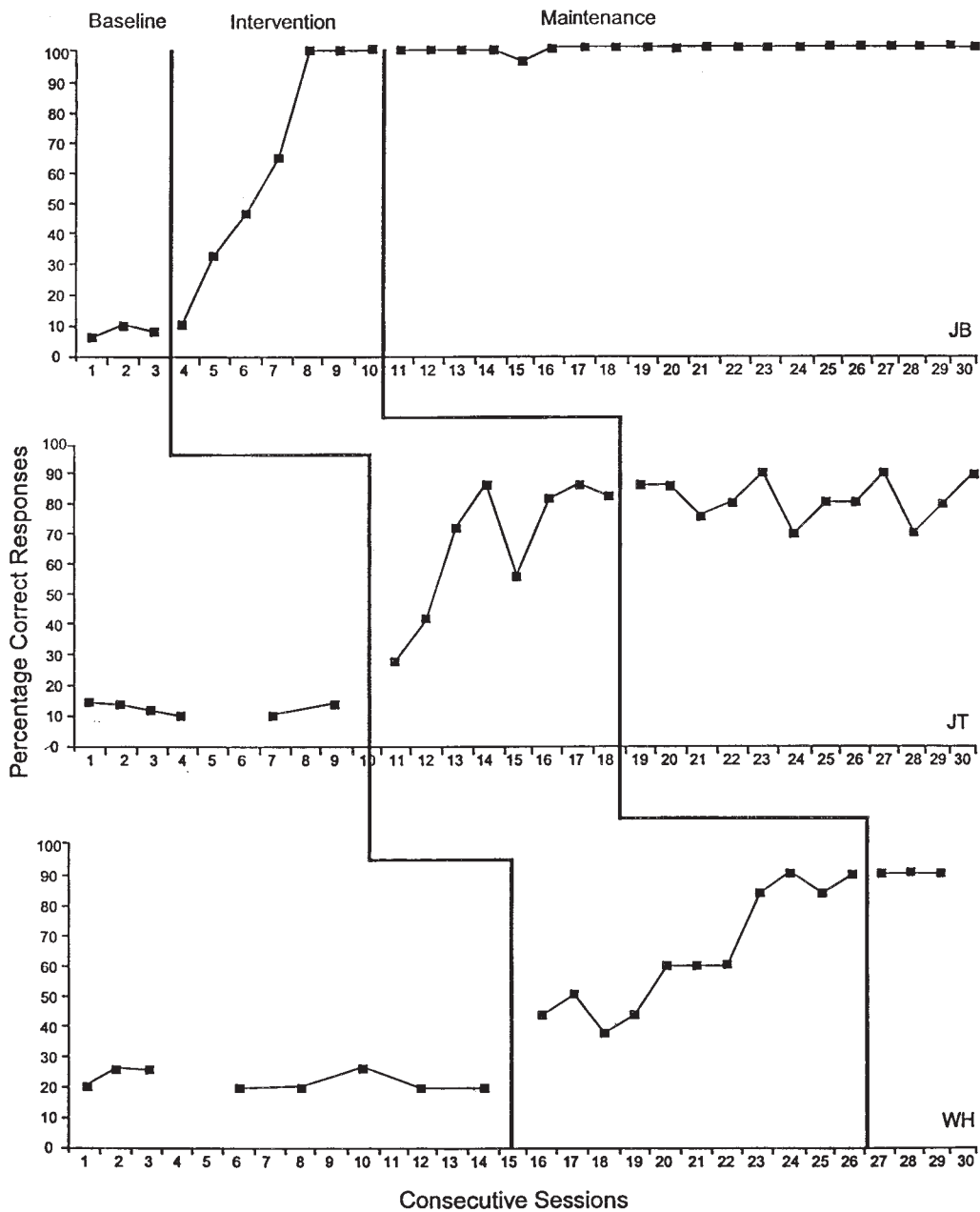


Figure 1. Percentage of correct responses of JB, JT, and WH (Group 1).

critterion level of 80% after the fourth intervention sessions and maintained that level for three consecutive sessions. GS correctly completed between 66% and 100% of the steps for the five intervention sessions, with a mean of 86% correctly completed steps. GS reached

the critterion level of 80% after the third intervention session and maintained that level for three consecutive days. Last, AH correctly completed between 40% and 86% of the steps, with a mean of 60% correctly completed steps. AH reached the critterion level of 80%

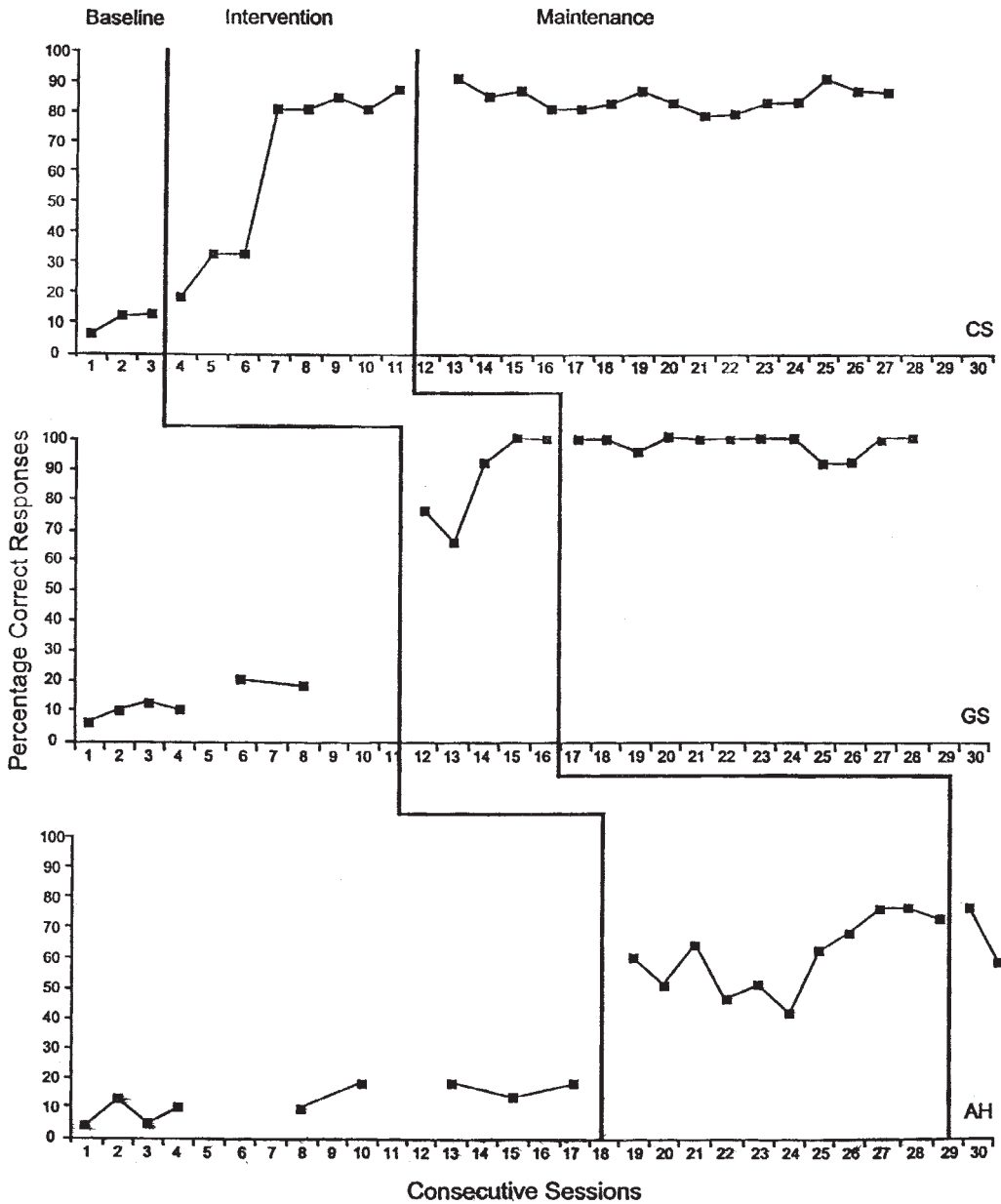


Figure 2. Percentage of correct responses for CS, GS, and AH (Group 2).

after the tenth intervention session and maintained that level for three consecutive sessions.

Maintenance. During maintenance, CS correctly completed between 80% and 96% of the steps, with a mean of 86% correctly completed steps. CS maintained that level for two

months. GS correctly completed between 92% and 100%, of the steps for the nine maintenance sessions over one and one half months, with a mean of 97%. Last, AH correctly completed between 63% and 77% of the steps, with a mean of 69% correctly completed. AH was in maintenance for 1 month.

Social Validity

Informal feedback from two special education teachers and four general education teachers regarding their satisfaction of the procedure and results was obtained. Both special education teachers noted that participants in both groups were more conscientious about their behavior. One teacher made the comment that their behavior had improved because students did not know when they would be observed. They wanted to do a good job in all their classes because of their participation in the study. These teachers felt that this was positive experience for participants. In addition, they indicated that overall ability to following directions improved both in the general education and special classrooms.

Four general education teachers commented that participants seemed to participate more in class and completed their work at a more consistent level than before the intervention. The teachers were satisfied with the changes in student behavior and completion of work tasks after directions were followed. They also noted that as participants began to monitor their own behavior, they needed less teacher-directed supervision. The art teacher commented that, although AH is better at following directions, he was still unable to leave other classmates alone while working.

Discussion

These findings suggest that students with moderate to severe disabilities successfully employed self-monitoring to promote their participation in general education. With appropriate supports, there is no question that students with moderate to severe disabilities will benefit in inclusive education, and self-monitoring represents a potentially effective self-directed support (Hughes et al., 2002). Dramatic changes in performance levels were observed for all students, and these changes were maintained for all participants up to two months after the intervention was withdrawn. Additionally, the social validation data obtained indicated that both special and general educators involved in the investigation observed positive changes in the students' performance and believed that the strategy enhanced students' participation in class.

Despite ample illustrations of the positive effects of self-monitoring (see Agran, 1997; Wehmeyer, Agran, & Hughes, 1998), there are relatively few investigations of self-monitoring conducted in inclusive settings with students with moderate to severe disabilities (Gilberts et al., 2001; Hughes et al., 2002). This study provides further evidence that students with moderate to severe disabilities can monitor their own behavior in a general education setting.

In addition to a lack of empirical studies, available data also suggest that a limited number of teachers instruct their students on how to use their strategy. Agran et al. (1999) reported that 35% of the teachers in their sample taught their students to self-monitor, with only 3% indicating that they have observed their students using this strategy. Wehmeyer et al. (2000) reported that 50% of the teachers in their sample taught their students to self-monitor, despite the fact that the majority of respondents rated this strategy as being very important. The paucity of investigations on effects of self-monitoring, and failure by teachers to teach these strategies, are surprising for at least two reasons. First, self-monitoring is relatively easy to teach and incorporate into classroom activity (Agran, 1997). It requires the student to discriminate a response and record its occurrence in some manner. There are numerous reports that students with severe disabilities can acquire these component responses (see Agran, 1998; Wehmeyer et al., 1998). Second, the strategy has great potential effectiveness across a variety of adaptive skills. As Baer (1984) noted, self-monitoring may function as a discriminative stimulus to cue desired responses. As such, it may also enhance generalization and maintenance by providing the student with a self-directed common stimulus across settings. Last, as a student-directed learning strategy, self-monitoring enhances student motivation by transferring ownership of data collection from teacher to student and, by doing so, permits the student to assess and evaluate his or her own performance. As Wehmeyer et al. (2000) noted, many teachers may not instruct students with moderate to severe disabilities to self-monitor, along with other student-directed learning strategies, because they believe that such students are incapable of learning to use such strategies; in effect,

instructional time can be better spent learning more practical and relevant skills. In the present study, all students across both groups learned the strategy and achieved the mastery criterion in from 5 to 11 instructional sessions (mean = 8.3 sessions). Clearly, the participants had little difficulty acquiring and applying the strategy to achieve positive outcomes. This study contributes to the emerging literature supporting use of instructing students to use student-directed learning strategies in general education classrooms.

A student's successful access to general education involves the performance of a repertoire of skills. In an investigation of the curricular skills valued most by general and special educators for students with severe disabilities involved in inclusive education, respondents ranked the acquisition and execution of self-determination and student-directed learning strategies as most important for successful inclusion (Agran & Alper, 2000). These strategies allow students to, in effect, support themselves, and they represent a critical educational outcome. There is no question that successful performance in general education requires competency in many skills, including core content and content facilitation or classroom survival skills; and following directions represents one of the most critical skills. Jackson, McCaleb, and Helwick (2002) discussed the importance of "people supports" in inclusive education and cautioned that the over reliance of such supports may produce undesired dependencies. Clearly, self-monitoring represents a support that potentially can serve to promote independence, self-reliance, and, ultimately, self-determination. Further, Jackson et al. recommend the value of personalizing instruction and supports to individual students. Needless to say, what better a way to personalize instruction than to teach students to monitor their own behavior.

Overall, the findings suggest that all students acquired and successfully employed the self-monitoring strategy in a relatively short period of time and successfully employed it at levels dramatically higher than in baseline. Nevertheless, there are several limitations to this study that warrant serious attention. First, although we knew the students self-monitored their performance and participating teachers reported that the students self-monitored

their behavior for the duration of the investigation, we did not calculate accuracy of their self-monitoring. In one sense, this is may not be an important issue since there is considerable research that suggests self-monitoring produces desired and reactive effects whether students accurately or inaccurately monitored their performance (see Agran, 1997; Wehmeyer et al., 1998). Nevertheless, it would have been of interest to determine the accuracy of the students' records. Second, although participating teachers positively evaluated the value of teaching students to self-monitor their own behavior, logistical and temporal constraints prevented collection of student social validation data. The fact that their use of the strategy produced positive changes for all students represents a desired outcome, but we do not know what the students' perceptions were regarding their use of the strategy. Clearly, future research on effects of self-monitoring warrants the collection of such data. Additionally, future research should obtain social validation data from typical peers on their opinions about the students' use of this strategy. Third, the investigation failed to investigate the generalized effects of the students' use of the strategy. The fact that students employed the strategy in different settings suggest, at least in part, some generality, but no systematic efforts were made to investigate generalized effects across non-targeted behaviors or settings. Such an examination is warranted in future research.

Despite these limitations, we believe that the study contributes to the emerging literature on student-directed training in inclusive settings. There are relatively few applications of self-determination or student-directed learning strategies with students with moderate to severe disabilities in inclusive classrooms, especially students at the junior high or middle school level. Findings of this study demonstrate that students with moderate to severe disabilities can monitor their own behavior in general education (Agran, 1997; Agran et al., 2003). It is safe to say that failure to follow directions will produce unsatisfactory educational outcomes for all students. Findings of the present study suggested that students with moderate to severe disabilities learned to appropriately respond to their teachers' directions and completed the tasks as directed by employing a self-directed mon-

itoring procedure. Use of such strategy will assuredly enhance learning in general education for students.

References

- Agran, M. (1997). *Student-directed learning: Teaching self-determination skills*. Pacific Grove, CA: Brooks/Cole.
- Agran, M. (1998). Teaching self-monitoring, self-evaluation, and self-reinforcement strategies. In M. Wehmeyer & D. J. Sands (Eds.), *Making it happen: Student involvement in educational planning, decision making, and instruction* (pp. 355–377). Baltimore: Paul H. Brookes.
- Agran, M., & Alper, S. (2000). Curriculum and instruction in general education: Implications for service delivery and teacher preparation. *The Journal of the Association for Persons with Severe Handicaps*, 25, 167–174.
- Agran, M., Blanchard, C., Wehmeyer, M., & Hughes, C. (2002). Increasing the problem-solving skills of students with developmental disabilities participating in general education. *Remedial and Special Education*, 23, 279–288.
- Agran, M., King-Sears, M., Wehmeyer, M., & Copeland, S. (2003). *Teachers' guide to inclusive practices: Student-directed learning*. Baltimore: Paul H. Brookes.
- Agran, M., Snow, K., & Swaner, J. (1999). Teacher perceptions of self-determination: Benefits, characteristics, strategies. *Education and Training in Mental Retardation and Developmental Disabilities*, 34, 293–301.
- Agran, M., & Wehmeyer, M. (2002). Promoting the self-determination of students with severe disabilities. In D. Ryndak & S. Alper (Eds.), *Curriculum and instruction for students with significant disabilities in inclusive settings* (pp. 259–276). Boston: Allyn & Bacon.
- Baer, D. M. (1984). Does research on self-control need more control? *Analysis and Intervention in Developmental Disabilities*, 4, 211–218.
- Copeland, S., Hughes, C., Agran, M., Wehmeyer, M., & Fowler, S. (2002). An intervention package to support high school students with mental retardation in general education classrooms. *American Journal on Mental Retardation*, 107, 32–45.
- Gilberts, G., Agran, M., Hughes, C., & Wehmeyer, M. (2001). The effects of peer-delivered self-monitoring strategies on the participation of students with severe disabilities in general education classrooms. *Journal for the Association for Persons with Severe Handicaps*, 26, 25–36.
- Hughes, C., Copeland, S., Agran, M., Wehmeyer, M., Rodi, M. S., & Presley, J. (2002). Using self-monitoring to improve performance in general education high school classes. *Education and Training in Mental Retardation and Developmental Disabilities*, 37, 262–272.
- Jackson, L., McCaleb, K., & Helwick, G. (2002). Facilitating skill acquisition during general education academic subjects, electives, and other activities. In D. Ryndak & S. Alper (Eds.), *Curriculum and instruction for students with significant disabilities in inclusive settings* (pp. 151–172). Boston: Allyn & Bacon.
- Kazdin, A. E. (1982). *Single-case research designs: Methods for clinical and applied settings*. New York: Oxford.
- Lovitt, T. C. (2000). *Preventing school failure: Tactics for teaching adolescents*. Austin, TX: Pro-Ed.
- Mithaug, D. E. (1993). *Self-regulation theory: How optimal adjustment maximizes gain*. Westport, CT: Praeger.
- Mithaug, D. E. (1996). *Equal opportunity theory*. Thousand Oaks, CA: Sage.
- Mithaug, D. E., Mithaug, D. K., Agran, M., Martin, J. E., & Wehmeyer, M. (2002). *Self-determined learning theory*. Mahwah, NJ: Lawrence Erlbaum.
- Tawney, J. W., & Gast, D. L. (1984). *Single subject research in special education*. New York: Merrill.
- Watson, D. L., & Tharp, R. G. (1989). *Self-directed behavior: Self-modification for personal adjustment*. Pacific Grove, CA: Brooks/Cole.
- Wehmeyer, M., Agran, M., & Hughes, C. (1998). *Teaching self-determination to students with disabilities: Basic skills for successful transition*. Baltimore: Paul H. Brookes.
- Wehmeyer, M., Agran, M., & Hughes, C. (2000). A national survey of teachers' promotion of self-determination and student-directed learning. *The Journal of Special Education*, 34, 58–68.
- Wehmeyer, M., Sands, D. J., Knowlton, H. E., & Kozleski, E. B. (2002). *Teaching students with mental retardation: Providing access to the general curriculum*. Baltimore: Paul H. Brookes.

Received: 7 August 2003

Initial Acceptance: 3 October 2003

Final Acceptance: 15 February 2004