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Participation of Students with Moderate to Severe Disabilities in the General Curriculum: The Effects of the Self-Determined Learning Model of Instruction

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This study investigated the effects of the Self-Determined Learning Model of Instruction (SDLMI) on the academic skill performance of three junior high school students with moderate to severe intellectual disabilities. The academic skills taught were aligned to the district general curriculum, and extended benchmarks were individually determined. The students were instructed to engage in a self-regulated problem-solving strategy, as well as to use one or more additional student-directed learning strategies. The results suggested that all students were able to acquire and maintain target academic skills to mastery levels. Also, all stakeholders had positive perceptions about the value of such instruction. The implications of these findings relative to the general curriculum initiative are discussed.

DESCRIPTORS: self-determination, problem solving, access to the general curriculum

Since the 1997 Amendments to the Individuals with Disabilities Education Act (IDEA) were enacted, much attention has been directed toward procedures to ensure that students have greater access to the general curriculum. Required in the legislation was demonstration that students needed to participate in the general curriculum to the maximum extent appropriate (Federal Register, 1999, p. 12,592). Specifically, districts were required to provide information on the educational programs and supports needed to ensure that a student will appropriately attain annuals goals relative to the general curriculum, be involved and participate in the general curriculum, and be educated and participate with children with and without disabilities. Inherent in this mandate was the belief that by requiring that school districts include such information in IEPs, students would have greater access to a challenging curriculum; and, as a consequence, teacher expectations for their students would increase (Wehmeyer, Lattin, Lapp-Rincker, & Agran, 2003). Additionally, and most importantly, the mandate required that students' special education programs be aligned with state and local standards and accountability mechanisms (Browder et al., 2003; Wehmeyer, Field, Doren, Jones, & Mason, 2004). That is, to ensure that all students need to meet the same high-quality content standards, instruction for all students needed to be based on the same curriculum.

Despite such national, state, and local interest in ensuring student access to and progress in the general curriculum, little research has been conducted on facilitating this access for students with intellectual disabilities. Although there have been several reports in the research literature on issues relating to providing students with disabilities access to the general curriculum (Wehmeyer, Lattin, & Agran, 2001; Wehmeyer, Sands, Knowlton, & Kozleski, 2002), little attention has been directed toward instructional factors related to the general curriculum. In particular, the research literature includes few investigations of the effects of specific instructional manipulations on the performance of students with intellectual disabilities in the general

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curriculum. Although there is evidence that the behavior analytic procedures commonly used by special educators (e.g., shaping, response prompting) have utility in inclusive settings (Agran, Alper, & Wehmeyer, 2002; Billingsley & Kelley, 2004; Ryndak & Alper, 2003), instructional approaches specific to accessing the general curriculum have received scant attention, particularly for students with mental retardation. As Wehmeyer, Lance, and Bashinski (2002) indicated, although the 1997 Amendments emphasized the adoption of school-wide interventions to promote access to the general curriculum (e.g., instruction in problem solving), their utility for students with intellectual disabilities is neither a concern or an issue that has been systematically investigated. Further, to ensure progress for students with disabilities whose needs are not being met by school-wide efforts, individualized interventions to promote access need to be developed, but such interventions have not been adequately investigated. Last, in a review of the literature by Nietupski, Hamre-Nietupski, Curtin, and Shrikanth (1997) on the effects of interventions across content areas, it was revealed that relatively few investigations were conducted in academic skills (fewer than 10%). Instead, most research was conducted on social skill development and social inclusion—important skill areas, but not germane to the current focus on high-quality academic content in the general curriculum. Needless to say, these findings are disconcerting for educators committed to promoting access for their students.

Two other factors appear to have impeded research in this area. First, in a survey conducted by Agran et al. (2002) on the perceptions of teachers regarding access for students with severe disabilities, the majority of respondents indicated that access is more important for students with mild disabilities than severe, and that their respective school districts had no clear plans for ensuring access for these students. Given that the majority of teachers did not think access was appropriate for these students, it is not surprising that research has not been sufficiently conducted in this area. Second, Wehmeyer et al. (2003) conducted an observational study of 33 students with mental retardation to examine the extent to which they are involved in tasks related to the general curriculum. Although the findings revealed that students with mental retardation served in a general education classroom were working on tasks related to a district standard in 90% of the intervals observed, there was a significant difference by setting in that students in self-contained settings were much less likely to be involved in a task relating to a standard. This study regrettably supported the findings of the Agran et al. (2002) investigation and suggested that access was not being experienced by many students with intellectual and developmental disabilities.

The access mandates require that the IEPs of students receiving special education services identify specific accommodations and curriculum modifications to ensure their involvement in the general curriculum. These accommodations and modifications are designed to increase the likelihood that students with disabilities, including students with intellectual and developmental disabilities, benefit from instruction in the general curriculum (Wehmeyer & Agran, 2006). Wehmeyer et al. (2001) have suggested two such levels, *adapting the curriculum* and *augmenting the curriculum. Adaptations* refer to the way curricular content is represented, that is, the way information in the curriculum is depicted or portrayed (e.g., reading text out loud rather than in print). The second level of curricular modification involves *curriculum augmentation* (Knowlton, 1998; Wehmeyer et al., 2001). With curriculum augmentation, the standard curriculum is enhanced with "metacognitive or executive processing strategies for acquiring and generalizing the standard curriculum" (e.g., problem solving, goal setting) (Knowlton, 1998, p. 100). In particular, Wehmeyer et al. (2004) noted that strategies to teach students with intellectual disabilities to become more self-determined represent curriculum augmentation strategies appropriate for this population. Such strategies allow students to manage, direct, and regulate their own learning and permit students to plan, execute, and evaluate actions based on problem solving and self-directed decision making (Agran, King-Sears, Wehmeyer, & Copeland, 2003). Self-determination has been strongly associated with enhanced motivation and positive learning outcomes (Mithaug, Mithaug, Agran, Martin, & Wehmeyer, 2003). These strategies allow students the means to control their curricular augmentations and, by doing so, enhance their participation in the general curriculum.

One instructional model to promote self-determination model that has been empirically validated is the *Self-Determined Learning Model of Instruction* (SDLMI; Agran, Blanchard, & Wehmeyer, 2000; McGlashing-Johnson, Agran, Sitlington, Cavin, & Wehmeyer, 2004; Mithaug, Wehmeyer, Agran, Martin, & Palmer, 1998; Palmer, Wehmeyer, Gipson, & Agran, 2004; Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000). For example, Agran et al. (2000) taught 19 students with severe disabilities to use the model to achieve transition-related outcomes. Target behaviors included following directions, improving job task performance, improve budgeting skills, independently making transportation arrangements, and improving personal hygiene skills. Positive increases in targeted behaviors were observed for 17 of the students. Also, four transition-age youth with mental retardation or developmental disabilities were taught to use the model to increase their direction following, contributions to classroom discussion, and appropriate touching (Agran, Blanchard, Wehmeyer, & Hughes, 2002). All of the students increased their performance levels to 100% and maintained that level for the duration of the study. Last, McGlashing et al. (2004) taught four students with extensive to pervasive support needs to use the model to improve selected work skills in a community-based transition program.

The SDLMI incorporates principles of self-determination and student-directed learning to form an instructional model (Agran et al., 2000) and involves teaching students to learn and apply one or more curriculum augmentation strategies (e.g., self-monitoring). It involves a three-phase problem-solving process in which the student learns to set a goal for him- or herself, to develop and implement an action plan to achieve the goal, to evaluate progress in achieving the goal, and, last, to adjust the goal or plan accordingly if needed. Although the SDLMI has been found to be effective in increasing work and community-living functional skills, its effects on academic skill performance have not been reported. Given current interest on promoting access to the general curriculum for all students with disabilities, research on the effects of the model on academic skill performance appears warranted. The purpose of the present investigation was to examine the effects of the SDLMI on the academic performance of three students with moderate to severe disabilities across a variety of general education content classes.

Methods

Participants and Setting

Three students with moderate to severe disabilities, who were receiving educational services at middle school or junior high schools, participated in this investigation (see Table 1). The first student, Mary, was enrolled at a middle school that served approximately 350 seventh and eighth grade students. Mary was an eighth grader with a moderate to severe intellectual disability and received Level 2 support services. (Note: According to school district policy, Level 1 involved providing the least support and Level 3 the most.) This support involved having an associate (aide) in general education classes. Mary was included in science, social studies, exploratory classes (i.e., elective subjects), and physical education. Over the last year, Mary had frequently refused to participate in class activities. The special education teacher attributed this to Mary beginning to see herself as different that the rest of the general education students.

Dan attended a neighborhood K-12 laboratory school affiliated with a local university, which served about 650 students. Dan was in the eighth grade and served primarily in a resource style room with inclusion in geography, speech, band, and physical education. Dan was classified as having a moderate level of intellectual disability with secondary classifications of a behavior disorder and attention deficit hyperactive disorder. He received Level 2 support services. These services were provided in the resource room during the remaining 4 hrs of the day. Dan's resource teacher was in daily contact with his general education teachers. He reviewed Dan's assignments for the next day to ensure that Day understood what was expected and reviewed concepts covered that day. Dan was very active and required constant reminders to focus his attention back to the task at hand. Dan also had difficulty with various social interactions. He would interrupt conversations, demanded that he be the center of attention, and threatened physical violence when other students verbally picked on him.

Lee was classified as having an Autism Spectrum Disorder. He was nonverbal and received Level 3 support, which also included having an associate at all times. He received his educational services primarily in a resource classroom and was included in science, math, social studies, and physical education. Lee attended the same school as Mary and was in the seventh grade. Lee required constant supervision to keep on task at hand and had very little to no social interaction with other students.

Observations took place in the two science classrooms and a geography classroom. Mary's physical science class had desks in rows in the middle of the class with lab stations around three of the four walls. Supplies for the

Table 1
Student Characteristics

Name	Age	Gender	Grade	Disability[a]	Support needs[b]	Participation in general education	Challenging behavior
Mary	15	Female	8th	Intellectual disability	Limited–extensive (Level 2)	Included in 3 of 7 general education classes	Noncompliance
Dan	15	Male	8th	Intellectual disability, behavior disorder	Limited (Level 2)	Included in 4 of 7 general education classes	Inattentive, oppositional
Lee	13	Male	7th	Autism spectrum disorder	Pervasive (Level 3)	Included in 4 of 7 general education classes	Inattentive, noncompliance, vocal outbursts, touching other student

[a] Based on Iowa guidelines of need for support. Standardized intelligence or performance test scores are used for supportive information but are not included in the IEPs.
[b] Based upon support hierarchy from *Mental retardation: Definition, Classification, and Systems of Support*, by the American Association on Mental Retardation, 2002, Washington, DC: American Association on Mental Retardation. Level of support in parentheses represent classification based on school district policy.

labs were obtained from storage areas around all four walls with some supplies obtained from the teacher. In general, there was a lab every other day with labs occasionally running into 2 days. Each lab group consisted of four to five students. Although Mary was included in the lab group, the teacher reported that other peers gave little direction or support to her. Training took place in a small room adjacent to the lab.

Dan's geography class was set up in typical rows. Dan sat toward the back of the room with an associate with him as needed. His training took place in the resource room with his teacher.

Lee's life science class was set up with lab stations throughout the room with sinks available for different labs. Students sat on stools on three sides facing the front of the room. Lee generally sat in a small reading area set up on the side of the room with science textbooks and a small sofa. When there were group activities, Lee was involved with a group of three to five students, depending on the activity. Lee's peers assisted him in participating with the guidance of this associate. Training took place in the same area.

The cooperating general and special educators collaborated in differing ways for each student. Mary's special education teacher worked very closely with the researchers in identifying target skills and allowing time for Mary to goal-set and self-evaluate. Her general education teacher had little to no contact with the special education teacher or the researchers after the initial meeting.

Dan's special education teacher collaborated with the general education teacher on the many target skills Dan could develop, as well as allowing Dan to practice his self-instruction strategy in the general classroom. The special education teacher also worked closely with the researchers in collecting performance and interobserver agreement data during the study.

Both of Lee's teachers (special and general) collaborated to identify target behaviors and design the student-directed learning strategy. Also, his general education teacher made a strong effort to provide opportunities for Lee to practice using the strategy in completing the task.

Dependent Measures and Recording

Academic Skills

The participants had a central role in identifying both the target skills and the student-directed or augmentative learning strategy. These skills were related to the district's general education standards. Each student with the assistance of a researcher and his or her special education teacher identified a specific curriculum area he or she wished to focus on. Each student was given the choice of selecting his or her goal from three to seven different academic areas. These choices were based on the general education curriculum standards and benchmarks for each school district, student input, and teacher input. Mary was provided three choices: practicing the scientific inquiry, understanding motion and simple machines, and understanding the states of matter. Dan was given seven choices including understanding different parts of a map, understanding different types of maps, understanding different information on a map, and knowing the different states surrounding Iowa. Lee's choices involved learning about the environment, learning about the DARE program, and learning about the organ systems of the body. Mary and Dan were verbally given the choices by the researcher whereas Lee was shown pictures of each content area, in which he chose by pointing at the area he wished to work on. The chosen target behaviors included participation in lab activities (Mary), identification of different types of maps (Dan), and identification and functions of major

Table 2
Standards and Benchmarks

Student	Standard	Benchmark	Goals from which selected	Goal chosen	Measurement of goal
Mary	Understands the nature of scientific inquiry	Designs and conducts scientific investigation (Grades 6–8)	Practicing the scientific inquiry, understanding motion and simple machines, understanding the states of matter	Practicing the scientific inquiry	Correct performance of lab task sequence activities
Dan	Reference and map skills	Identify and use different types of maps (Grades 6–8)	Understanding different parts of a map, understanding different types of maps, understanding different information on a map, knowing the different states surrounding Iowa	Understanding different types of maps	Correct responses to question set
Lee	Understanding that organ and organ systems are composed of cells and help provide all cells with basic needs	Identify organs and organ systems (Grades 6–8)	Learning about the environment, learning about the DARE program, learning about the organ systems of the body	Learning about the organ systems of the body	Correctly identifying the organ system and matching it to its function

body systems (Lee). These were related to the standards and benchmarks of their school district (Table 2).

Mary wished to increase her participation in lab activities and selected this as a goal. This included getting up from her chair and moving directly to her lab station, assisting in gathering materials, manipulating any aspect of the lab activity, and writing results in her lab manual. Originally, she selected self-monitoring as a self-directed learning strategy (see Intervention I) to achieve the goal; however, she indicated later that she felt uncomfortable self-monitoring during class when others might be watching. Consequently, it was decided that she would monitor her performance after class. Additionally, she expressed an interest in goal setting (see Intervention II). Before each science class, Mary would review a list of activities done in lab activities (e.g., gather materials, assist in activity, record information in log book, assist in cleaning up) and indicate which ones she would perform. At the end of class, she would monitor whether she had performed each of these activities.

Dan's target behavior involved asking a series of questions to identify what type of a map he needed to find desired information. These questions included identifying what type of information he was looking for, identifying what types of maps were available, selecting a map, and looking for the desired information on the map. These questions were asked out loud by Dan during the learning task. Dan chose a self-monitoring procedure, as well as self-instruction (see Intervention I).

Lee's target behavior consisted of locating the correct image of the body system (e.g., circulatory, muscular, and respiratory systems) when asked. Images were presented to him that depicted the various functions of the body system. For example, pictures of people lifting weights and jumping rope were used to illustrate the function of the muscular system. Lee was asked to match the image of the body system with the image of the function that body system performed.

The instructional sequence for each student was designed so that the student-directed learning strategy (e.g., self-instruction) was embedded in the task sequence. This was done to ensure the integral relationship between the self-directed learning strategy and the task and to allow the student to know when to apply the strategy.

Observation Procedure

One teacher and two paraprofessionals collected data on a regular basis throughout all experimental conditions. Based on the scheduling of labs and the student schedules, data were collected two to four times per week during the baseline and training conditions. Probe maintenance data were collected at least once per week up to 3 1/3 months. The types of data differed across the three participants but were all converted into percentages to allow for comparison across individuals. For Mary, data were obtained on frequency of correct responses for both the task (participation in lab activities) and self-monitoring. Data obtained for Dan involved frequency of correct responses and production of the self-instructions via sign language prior to task performance. Data for Lee consisted of the percent of correct responses to content test questions.

Observer Training

Mary's and Lee's teaching associates, as well as Dan's teacher, were involved in 7–16 individual training sessions. During training, the data collection system was explained and the target behaviors defined. Both exemplars and nonexemplars of the target behaviors were used for clarification and demonstrated by the researcher. All training took place prior to baseline data collection. On-site training observations were conducted after observers met a 90% mastery criterion for two consecutive sessions.

Interobserver Agreement

Interobserver agreement data were collected across approximately 25% of sessions by the lead researcher. A point-by-point comparison was used to calculate interobserver agreement throughout the investigation. Agreement was calculated by the number of agreements divided by the number of agreements plus disagreements multiplied by 100 (Kazdin, 1982). The range across all students was 85–100%, with a mean of 98% across all experimental conditions for all three participants. For Mary and Dan, agreement data were calculated for both task performance and self-directed responses. Means of 98% and 85%, respectively (with a range of 94% to 100% and 80% to 98%), were reported. Task performance data for Lee ranged from 93% to 100% with a mean of 98%.

Experimental Design and Conditions

To assess the effects of the intervention, a multiple baseline across individuals design was used (Kazdin, 1982). The experimental design included three experimental conditions: baseline, intervention, and maintenance (Note: A prebaseline component was also provided.) For Mary, a second intervention condition was introduced after she opted to change the student-directed learning strategy.

Prebaseline

Prior to baseline data collection, each student completed Phase 1. This phase consisted of four questions designed to assist the student in developing a goal. Teachers and researchers developed a variety of goals for each student based on the standards and benchmarks in the content area of the school district. As appropriate, supports were provided as the students worked through the series of questions. Each student was led through the available goals independently by the researcher. Mary and Dan were able to select goals with minimal support from the researcher. Lee required the use of pictures to prompt responding (i.e., to identify appropriate goals he would point to an image).

Baseline

All participants were observed in their general education classrooms. Each student was told he or she would be observed during his or her general education class but were not told why. Mary's science teacher included lab work every other day and allowed the researchers to observe during those class periods. Dan's social studies teacher and Lee's science teacher allowed class time during whole class independent and small group work for Dan and Lee to engage in their goals. The observers obtained information on the dependent measures. For Mary, the observations took place during a lab activity in science because her measure was participation in lab activities. The observation took place over the entire class period. Dan and Lee were observed during the entire class period too, but data were only collected during the particular learning activity related to their goal. Phase 2 was completed by each student during baseline before they moved into intervention. This phase involved four questions designed to assist students in developing a plan to achieve their goals. Students were shown different types of self-directed learning strategies (e.g., self-monitoring, self-instruction) and were asked to choose which one they would like to use. A verbal explanation of how each strategy functioned was provided. No instruction or feedback was provided in this condition. Each participant moved into the training condition after three consecutive sessions of stable responding were observed.

Intervention I

The SDLMI served as the intervention for the investigation. The SDLMI is designed to allow students to become causal agents in the lives. The model involves teaching students a self-regulated problem-solving process to allow them to set goals, plan courses of action, self-evaluate their performance, and adjust their goals or plans accordingly as needed. There are three phases to the model. Each phase of the model involves a problem that needs to be solved (What is my goal? What is my plan? What have I learned?). The problems are solved through a series of four student questions for each phase (see Table 3). By answering each question, the student participates in a problem-solving process that requires him or her to identify the problem, generate solution(s), implement a student-directed strategy to resolve the problem, and evaluate the action taken.

Training took place in a 15- to 20-min period during a study hall time or open resource time for all participants. Each participant was instructed on how to use the goal setting, self-monitoring, or self-instruction strategy. First, the strategy was modeled by the trainer who provided examples and nonexamples of the strategy. For example, Mary was shown a card listing eight activities that occurred each day during science lab (e.g., get materials, answer question in record book). The trainer circled the activities he or she would participate in that day to set the goal. After class, the student would check those completed.

Table 3
Student Questions

Phase 1–What is my goal?
What do I want to learn?
What do I know about it now?
What must change for me to learn what I don't know?
What can I do to make this happen?
Phase 2–What is my plan?
What can I do to learn what I don't know?
What could keep me from taking action?
What can I do to remove these barriers?
When will I take action?
Phase 3–What have I learned?
What actions have I taken?
What barriers have been removed?
What has changed about what I don't know?
Do I know what I want to know?

For Dan, his teacher and he developed a series of invented sign language that corresponded to each step of the self-monitoring and self-instruction procedure. For example, manual signs were developed to express the following questions: "What type of information am I looking for?", "What types of maps do I have to choose from?", "Which one would work best?," and "Pick it."

For Lee, self-instruction served as an augmentative learning strategy. The self-instruction involved the verbalizations "look, point, match." The associate demonstrated the strategy by giving a cue ("Where is the nervous system and what does it do"), followed by stating "look" (while looking at the choices of the pictures), then "point" (pointing at the correct choice) and "match" while matching the picture cue of the system with its function.

Students were provided multiple opportunities to perform the strategy with the trainer offering cues and directions as needed. Finally, the participant would perform the strategy without support from the trainer.

During the training stage, the observers observed the participant's use of the strategy in his or her general education classroom. Once the participant had reached the established criterion of at least 80% correct responding over three consecutive sessions, the participant moved on to the maintenance condition.

Intervention II

As mentioned previously, Mary decided to switch her learning strategy from self-monitoring during class to self-monitoring after class. At this time she was instructed to check off which of the steps in the task sequence she completed. Additionally, she had expressed an interest in goal setting (see Baseline condition).

Maintenance

The observations continued for each participant during this condition to determine the long-term effect of the training. Observations occurred one to two times per week. During maintenance each participant completed Phase 3 of the SDLMI to evaluate his or her progress. Phase 3 was completed by each student after he or she moved into the maintenance condition. In this phase, the students answered four questions in which they evaluated their progress toward achieving their goals. Mary and Dan were successful in responding to these questions. Lee had difficulty responding to the questions and the support personnel interpreted his responses, in part, via facial expressions and body gestures. During this condition, no feedback or prompts were delivered, Mary was given her goal setting card before each class.

Results

Baseline

Figure 1 displays the performance data for each participant; these data include performance on both the academic goal and the embedded student-directed learning strategy. All students demonstrated a stable pattern during baseline. Each participant had a mastery level of 80%. Mary's performance ranged from 13% to 25%, with a mean of 17. Dan had a range of 0% to 3%, with a mean of 0%. Lee had a consistent performance level of 0% in correctly identifying the body systems and their functions.

Training

All three students increased their performance of the target behaviors after they were taught to use the augmentation strategies. Mary performed at a range of 13% to 87%, with a mean of 67%. She achieved the mastery criterion after 10 training sessions. Dan's performance ranged from 83% to 100%, with a mean of 87%. He consistently performed at the criterion level across all sessions except one in which he performed at a 50% level. Lee's performance ranged from 20% to 80%, with a mean of 53%. He achieved the criterion level after 18 sessions.

Maintenance

All participants maintained the behaviors at desired levels. Mary maintained her performance at a range of 75% to 87%, with a mean of 85%. She was in maintenance for 3 1/2 months. Dan's performance ranged form 94% to 100%, with a mean of 99%. He was in maintenance for 2 months. Because of conflicts involved with end of the school year activities, only one maintenance observation session could be conducted for Lee. (Note: School district policy precluded the operation of a research project past May 1, which prevented the further collection of maintenance data.) He performed at an 80% level.

Social Validation

During maintenance each participant completed Phase 3 of the SDLMI. In this phase, each participant self-evaluated his or her progress toward meeting the self-selected goal. In regards to the first question "What actions have I taken?", Mary indicated that she worked harder in science class, and Dan said he learned a lot about maps. Lee made no verbal response but responded with positive facial expressions and, according to his associate, did not display any of the avoidance behaviors he had displayed in the past. When asked "What barriers have been removed?", Mary indicated that she has a paper that "tells me what to do," and Dan said he can look up things without teacher help. Lee made no verbal response to this question. When asked "What has changed about what I don't know?," Mary said she did not know, Dan said that he knows different maps, and Lee made no response. When asked the final question "Do I know what I want to know?," both Mary and Dan said "yes" and Lee made no response. Additionally, Mary's associate reported that she believed Mary had improved in participating in lab activities. Dan's special education teacher reported that Dan had improved in reading the map and finding desired information. Last, Lee's science teacher reported that Lee had improved in participating in class activities and that he had learned about his body systems and functions.

Discussion

The findings of the present study suggest that students with moderate to severe disabilities can utilize student-directed learning strategies—specifically, goal setting, self-monitoring, and self-instruction—to promote their access to the general curriculum. The students learned varying skills based on district standards in physical science, geography, and life science. Dramatic and immediate changes were reported across all students, with all students achieving the mastery criterion level (i.e., 80% correct responding across three consecutive sessions). Further, skills were maintained at the mastery level for two students for 3 1/2 and 2 months, respectively.

We suggest that the findings contribute to the literature in two ways. First, the findings contribute to the access to the general curriculum literature by suggesting that students with moderate to severe disabilities can acquire varying academic skills that are aligned with state and local standards. As mentioned previously, there is evidence to suggest that students with intellectual disabilities continue to be educated "outside" of the general curriculum, with IEP goals that are not aligned with general standards (Wehmeyer & Agran, 2006). Further, the literature includes few demonstrations of the use of student-directed or curriculum augmentation strategies (e.g., self-instruction, self-monitoring) in general education settings to access the general curriculum, despite the fact that such strategies could improve student performance. Most importantly, student involvement and participation in the general curriculum has not

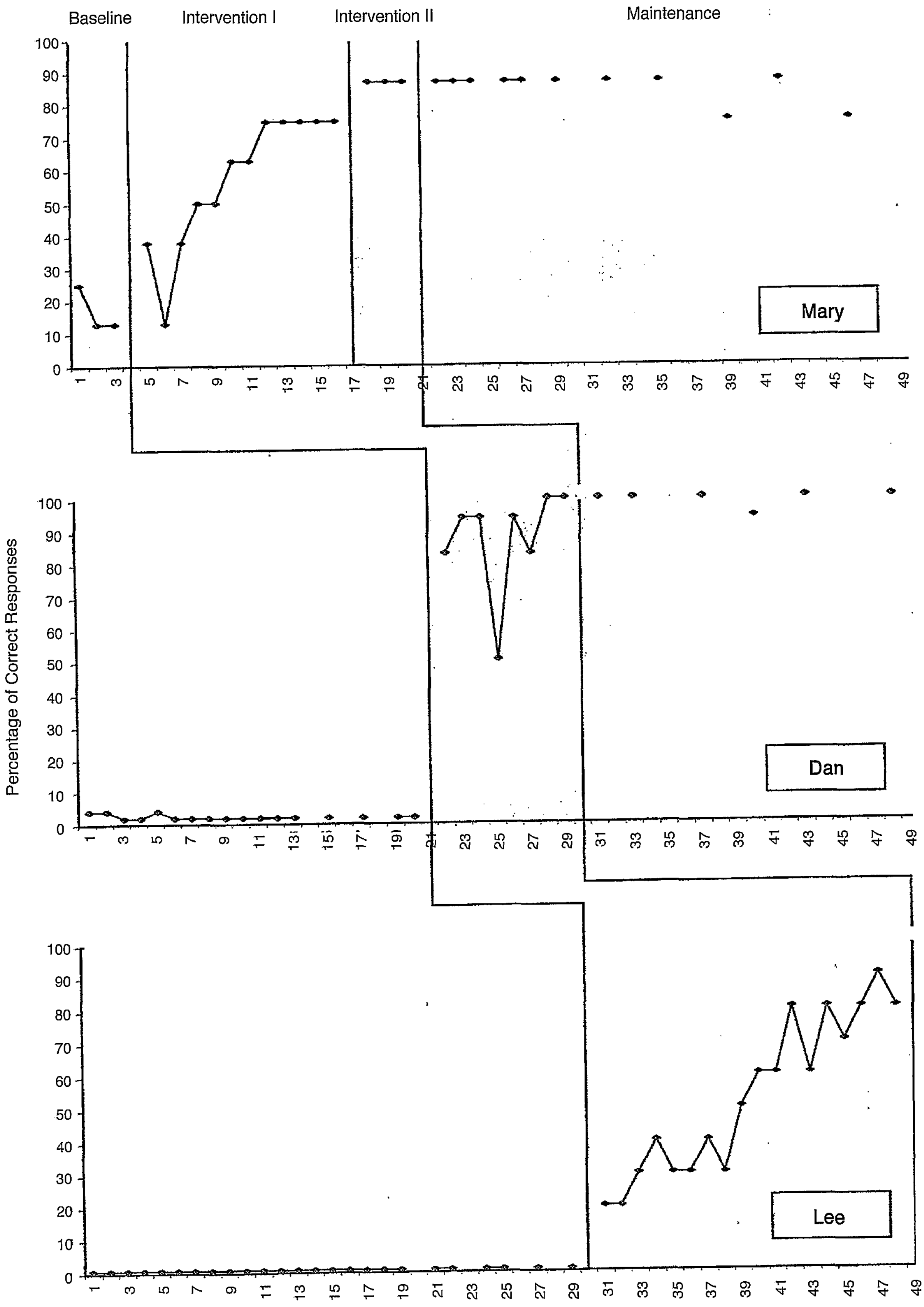

Figure 1. Percentage of correct responses of students across baseline, training, and maintenance conditions.

been realized to the extent possible as envisioned by the access to the general education initiative. In the present study, all participants demonstrated and maintained mastery across core skills. The findings clearly demonstrate that access to the general curriculum can indeed be a feasible goal for students with moderate to severe intellectual disabilities.

Although access has received much attention, this attention has largely been directed at issues relating to compliance and not instructional facilitation (Wehmeyer, 2003). The U.S. Office of Special Education Programs (OSEP; n.d.) indicated that little is known about how students with disabilities learn in general education settings and which strategies produce better outcomes. Further, OSEP indicated that sound pedagogy is needed to ensure access to the general curriculum, but few empirically sound studies have demonstrated the efficacy of instructional procedures to facilitate skill acquisition and maintenance relevant to the general curriculum. Further, Jackson, Ryndak, and Billingsley (2000) suggest that instructional strategies need to be evaluated within the context of general education practice. That is, instructional methodologies need to be examined in terms of the learning activities conducted in the general classroom. It is clear that there is a need to identify instructional procedures that will allow educators to tailor instruction to individual needs to facilitate student access to the general curriculum.

We suggest that the present study addresses the needs noted above. First, the student-directed learning strategies investigated provided all participants with strategies that allowed them to direct their own learning so that they could access the general curriculum and standards specific to their needs. The participants were responsible for selecting the target goal; selecting an intervention strategy; being actively involved in goal setting, self-monitoring, or self-instruction; and, ultimately, in evaluating their own performance. Although the extent to which students were engaged in self-directing their own learning differed across students, all students followed the three phases of the learning model and self-directed at least one aspect of the learning experience.

As indicated previously, the instructional model was designed so that the student-directed learning component (e.g., self-monitoring) was included in the task sequence. This provided the student with the opportunity to self-direct his or her learning while completing the task. Self- or student-directed learning strategies are often thought of as supplementary instructional procedures that are performed prior to or after task completion. In the present investigation, efforts were made to make the student-directed strategy integral to task completion so that the student could experience their connectivity. We believe that this allows the student to control and support their learning independently and measure progress on both academic and self-direction skills.

Second, employing the instructional model appeared to produce immediate and positive changes in academic performance, with performance levels consistently maintaining at mastery criteria across participants. Browder and colleagues indicated that further research is needed to demonstrate how to teach students with severe disabilities advanced academic skills as we move toward the implementation of NCLB, and the present study suggests a potentially useful means to facilitate academic instruction. As Browder noted, instruction to promote self-determination can serve as a springboard for general education access. As suggested previously, the SDLMI provides students with self-directed or curriculum augmentation strategies (e.g., self-instruction) that allow students to engage in self-regulated problem solving. Agran and Wehmeyer (1999) suggested that individuals with intellectual or developmental disabilities have traditionally been denied problem-solving instruction because it was felt that they could not benefit from such instruction. Not surprisingly, there have been relatively few investigations on the effects of problem-solving instruction for individuals with intellectual or developmental disabilities. The present study contributes to the emerging body of literature on the positive effects of problem-solving instruction (Agran et al., 2000; Wehmeyer, Agran, & Hughes, 2000). It would be imprudent to suggest that all of the participants actively engaged in all aspects of problem solving to achieve task outcomes. Nevertheless, the data suggest that increases in task performance were consistent with instruction in which the students were asked, with varying levels of support, to respond to the question set in each instructional phase and utilize a self-directed learning strategy. Accordingly, the self-regulated problem-solving instructional program produced positive learning outcomes.

Third, the strategies investigated optimize educational opportunities to tailor instruction to individual needs. The strategies maximized student involvement and engagement in academic learning. Carter, Clark, Cushing, and Kennedy (2005) suggested that educators should promote more active student management of their own academic behavior, and the present study sought to do exactly that. By having students go through the three phases of the learning model and employing their preferred student-directed learning strategy, the students had an active role in all aspects of the learning experience from goal setting to self-evaluation. In a review of instructional procedures used in general education students, Klingner and Vaughn (1999) indicated that students with disabilities appreciate being actively engaged in learning experiences and being provided opportunities to make choices about educational procedures. The instructional procedures examined in this investigation clearly provide a means to achieve these outcomes.

Although problem solving and other student-directed learning strategies are ranked high by teachers as an instructional technology to promote positive learning outcomes in general education (Agran & Alper, 2000), relatively few teachers are teaching these skills (Karvone, Test, Wood, Browder, & Algozzine, 2004; Wehmeyer et al., 2000). Several researchers have suggested that the majority of teachers in their respective samples did not teach their students self-determination-related skills (see Agran, Snow, & Swaner, 1999; Mason, Field, & Sawilowsky, 2004; Wehmyer et al., 2000). Karvonen et al. (2004) indicated that, despite the apparent importance of self-determination for students with disabilities, little research exists documenting schools that are indeed teaching these skills, and those descriptions that are published have little or no empirical evidence of efficacy, particularly for students with severe disabilities. We believe that the present study suggests a functional relation between the intervention (SDLMI) and the target behavior, and thus it suggests an effective means for students to apply to learning situations in the general curriculum. As Karvonen et al. noted, most demonstrations of efforts to promote the self-determination of students with moderate to severe disabilities focus on the effects of teaching choice making. The self-regulated problem-solving approach examined in the present study allowed students to practice a number of skills associated with promoting self-determination (e.g., goal setting, self-evaluation). As mentioned previously, there are very few empirical studies on the effects of strategies to promote self-determination, particularly relating to academic instruction and, specifically, access to the general curriculum. We believe the present study contributes to this emerging literature.

Although the present study produced positive changes for all participants, a number of limitations warrant attention. First, the findings are specific to the target behaviors selected and the students who participated. Future research is clearly needed on other academic skills, as well as additional students with varying support needs. Second, although student-directed data were taken on Mary and Dan, such data were not collected on Lee. Because of changes in data collectors (paraprofessionals), it was difficult to teach the collectors how to discern Lee's self-directed behavior. Also, data on generalized effects were not obtained. Because instruction was provided in general education settings, we did not believe that generalization across settings was needed. However, because the strategies taught have been associated with positive generalized learning outcomes, an investigation of generalized responding (e.g., other academic skills) would have been useful to conduct. Third, procedural fidelity data were not collected. We do not believe this represents a serious threat because strong level changes were reported across participants and each was supported through the three phases of the instructional model. Additionally, only limited interobserver agreement data on both task performance and the student-directed learning strategies were collected. Because both were sequenced in the task, we did not feel that two separate groups of agreement data were needed. Nevertheless, the lack of such data does represent a limitation of the study. Fourth, although general comments on specific problem behaviors were obtained from general and special education teachers, no formal data were collected. Although the effects of the model on the students' challenging behavior were not investigated, such an examination may warrant future research. Fifth, although the effects of the model have been studied across a wide variety of students with varying severity and types of disabilities (see Agran et al., 2000; Palmer et al., 2004; Wehmeyer et al., 2003), there has been limited research conducted on the effects of the model with students who have the most severe disabilities. There is no question that the model as presently described involves a certain level of communicative capacity for participants that may be particularly challenging for a student who uses a nonsymbolic form of communication. As Brown, Gothelf, Guess, and Lehr (1998) suggested, communicative competence is strongly associated with self-determination. For example, Lee's display of self-determined behavior needed to be inferred via positive facial expressions and a reduction in avoidance behaviors. Consequently, the issue of how and to what extent an individual is displaying self-determined behavior (e.g., making a choice, engaging in self-initiated behavior) becomes more complex (and elusive) for an individual who engages in idiosyncratic communication. However, given the delivery of appropriate supports (i.e., stakeholders willing to assist with facilitating communication and behavior support), we believe that the model would produce positive effects for participants (as was the case with Lee) and suggest that such research be conducted in the future. Sixth, although limited social validation data were obtained from students via Phase 3 of the model, and several anecdotal comments by cooperating teachers were obtained, more extensive efforts to collect these data from all stakeholders were not conducted. Because the instructional procedures investigated were student driven, input from them on the benefits, as well as difficulties, of using these strategies would have been instructive. Likewise, additional information from the cooperating teachers would have been of great value. In particular, how did the students' use of strategies impact the learning environment, both that of the teachers and other students? Also, input from typical peers would have been worthwhile to obtain. In future investigations of the effects of these strategies in general education settings, collecting such social validation data is warranted. Last, the model provided the participants with an opportunity to engage in self-directed learning with appropriate supports. That is, the students were involved in goal selection, self-monitoring, and self-evaluation. As stated previously, the model is designed to augment or support learning and not preclude direct instruction. Consequently, it is assumed that teachers will develop, implement, and apply appropriate accommodations and modifications necessary to enhance learning. The student-directed strategies investigated provided the participants with an additional learning strategy that allowed them to access the general curriculum.

In summary, this study suggests that students with limited to pervasive support needs can acquire and maintain academic skills via the use of a self-regulated problem-solving procedure and the use of one or more student-directed learning strategies. As noted previously, there are relatively few empirical investigations of the effects of student-directed learning or self-determination strategies on school performance, which involve students with intellectual or developmental disabilities. In particular, there have been few studies that have investigated academic skill gains in general education settings for these students. Although educators may have differing opinions about the value of access to the general curriculum for students with significant learning needs, the present study suggests that when students with intellectual disabilities are systematically taught to engage in self-regulated problem solving and to use a self-directed learning strategy, they can acquire academic skills, at acceptable levels, that are aligned with district standards. These strategies allowed the students to apply a "learning-to-learn" instructional procedure to access new content. Most important, although the students were supported through the instructional process, they largely provided their own support in terms of responding to the questions across the three phases, implementing the self-directed strategy, and monitoring their own performance. Grigal, Neubert, Moon, and Graham (2003) suggested that the success of educational services is the degree to which students with disabilities become a guiding force in their own lives and learning. We suggest that the strategies investigated in the study did exactly that, and we encourage further investigation of their utility in the general education curriculum.

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