INCLUSION
2018, Vol. 6, No. 3, 164–174

DOI: 10.1352/2326-6988-6.3.164

Whole-Class Implementation of the *Self-Determined Learning Model of Instruction* in Inclusive High School Mathematics Classes

Sheida K. Raley, Karrie A. Shogren, and Annette McDonald

Abstract

Skills associated with self-determination (e.g., self-regulation, problem solving, goal-setting, planning) are infused throughout all secondary content standards, including career and college readiness standards for which all students are responsible. Given research demonstrating the link between self-determination and positive school and post-school outcomes, there is a need to examine the implementation and outcomes of instruction related to self-determination in inclusive general education classrooms. This article reports findings of a one-group, pretest-posttest design examining the impact of the *Self-Determined Learning Model of Instruction* (SDLMI), a model of instruction designed to be implemented by teachers to support students to learn skills associated with self-determination, on goal achievement of adolescents with and without disabilities in inclusive high school Algebra classrooms. Findings suggest that participants with and without disabilities attained educationally-relevant goals related to math following intervention. Directions for future research and practice are discussed.

Key Words: *self-determination; model of instruction; whole-class instruction*

Shogren, Wehmeyer, and Lane (2016) described the need for research examining the implementation of instruction to promote self-determination in inclusive general education classrooms targeting students with and without disabilities. They argued that instruction in the skills associated with self-determination (e.g., goal setting and attainment, problem solving, decision making) were critical for all students and that students with disabilities would significantly benefit from receiving this content in general education settings, applied to core content areas, alongside their peers. They further described how interventions, such as the *Self-Determined Learning Model of Instruction* (SDLMI, described subsequently; Shogren, Wehmeyer, Burke, & Palmer, 2017), could be conceptualized as Tier 1 interventions and be used by teachers to actively engage all students in learning skills associated with self-determination that are essential for college and career readiness (Morningstar, Bassett, Kochhar-Bryant, Cashman, & Wehmeyer, 2012). The purpose of this study was to address this need, and examine the implementation of the SDLMI in inclusive, secondary Algebra classes.

Self-Determination

Causal Agency Theory defines self-determination as a "dispositional characteristic manifested as acting as the causal agent in one's life" (Shogren, Wehmeyer, Palmer, Forber-Pratt, Little, & Lopez, 2015, p. 258). It suggests that self-determined actions are volitional, agentic, and driven by adaptive action-control beliefs. Such actions develop over time as young people have opportunities to develop autonomy, self-initiation, pathways thinking, self-direction, control-expectancy, psychological empowerment, and self-realization through applying goal-setting, problem

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

solving, decision making, action planning, and self-regulation skills across contexts, including academic environments. In focusing on the importance of teaching the skills associated with self-determination, Causal Agency Theory provides a guidance for the development of instructional strategies that enable greater causal agency in the goal setting and attainment process, such as the SDLMI.

Self-Determined Learning Model of Instruction

The SDLMI (Shogren, Wehmeyer, & Burke et al., 2017) was developed to be a model of instruction that could be used by teachers to enable students to take a role in directing their own learning by setting and going after goals, and solving problems encountered in the process. A model of instruction has been defined as "a plan or pattern that can be used to shape curriculums (long-term courses of study), to design instructional materials, and to guide instruction in the classroom and other settings" (Joyce & Weil, 1980, p. 1). Unlike stand-alone curricula, a model of instruction can be overlaid on any curricular area, meaning that teachers can use it to support students to set and go after goals in academic, transition, or social-emotional instruction.

The SDLMI has been researched since its initial introduction to the field (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000), and found to be an evidence-based model of teaching that enables students with disabilities to (a) set educationally relevant and valued goals; (b) create an action plan to achieve those goals; and (c) evaluate progress toward those goals, revising the action plan or goal as necessary. The SDLMI has been found to increase self-determination (Lee, Wehmeyer, Palmer, Soukup, & Little, 2008; Wehmeyer et al., 2012), access to the general education curriculum (Agran, Blanchard, Wehmeyer, & Hughes, 2001), and academic goal attainment (Agran, Cavin, Wehmeyer, & Palmer, 2006; Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012). Shogren et al. (2012) conducted a group-randomized control trial study examining the impact of the SDLMI on the attainment of academic and transition goals of 312 high school students with learning disabilities (LD) and intellectual disability (ID), and found that both groups of students demonstrated significant improvements in goal attainment; although, students with LD showed greater growth in academic goals and students with ID on transition goals. These differential findings may result from the priorities placed on different types of goals. For example, Kleinert, Harrison, Mills, Dueppen, and Trailor (2014) examined the goals selected by students with disabilities (the majority of whom had ID) receiving instruction related to self-determination, and found a lack of academic goals as the targets selected by students. As such, strategies are needed that embed self-determination instruction in core curricular content for all students.

Purpose of the Study

As described above, the SDLMI has been demonstrated to be efficacious in impacting the outcomes of students with disabilities, although more work is needed that focuses explicitly on the use of the SDLMI in the context of academic goal setting and attainment. Further, work is needed exploring the impact of the SDLMI when used classwide as a Tier 1 intervention with students with and without disabilities in inclusive core content classes. Such research has the potential to establish the SDLMI as a Tier 1 intervention that can be overlaid on core content to support all students, including students with disabilities to achieve academic goals. The purpose of the present study was to contribute to this line of work by conducting a small pilot study of the use of the SDLMI in inclusive secondary Algebra classrooms. We explored the following research questions

1. Do teaching skills associated with self-determination using the SDLMI have an impact on the self-determination and goal attainment of students with and without disabilities in inclusive, general education classrooms?
2. Do students with and without disabilities in inclusive, general education classrooms and their teacher find the SDLMI helpful in reaching academic goals related to the general education curriculum?

Method

Participants

Students with (n = 5) and without (n = 29) disabilities aged 14 to 16 years (M = 14.7; SD =

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

0.68 years) across two inclusive secondary mathematics classes (i.e., 13 students in one class and 21 in another) participated in the study. Of the participants with disabilities who received special education services, two had attention deficit hyperactivity disorder (ADHD), one had vision loss or blindness, one had a physical disability, and one identified as having two or more disabilities. Across students with and without disabilities, males outnumbered females (males $n = 22$, 64.7%; females $n = 12$, 35.3%). The majority of participants identified as White ($n = 19$, 55.9%) followed by Hispanic or Latino(a) ($n = 3$, 8.8%), Black ($n = 3$, 8.8%), and two or more races/ethnicities ($n = 5$, 14.7%). Students' and their teachers' previous experience regarding intervention associated with self-determination was not assessed prior to the start of the study, and the teacher was not provided training in the SDLMI prior to implementation. Table 1 provides additional demographic information.

Table 1
Demographic Characteristics of the Sample

	$N = 34$	
Characteristic	*n*	%
Disability		
No disability	29	85.3
ADHD	2	5.9
Physical disability	1	2.9
Vision loss or blindness	1	2.9
Two or more disabilities*	1	2.9
Gender		
Male	22	64.7
Female	12	35.3
Age		
14	15	44.1
15	15	44.1
16	4	11.8
M	14.68	*(SD = 0.68)*
Race/Ethnicity		
White	19	55.9
Hispanic or Latino origin	3	8.8
Black	3	8.8
Asian	1	2.9
Two or more races	5	14.7
Other	2	5.9
Missing	1	2.9

Note. ADHD = attention deficit hyperactivity disorder.
*Participant self-reported diagnoses of autism spectrum disorder, ADHD, and emotional or behavioral disorder.

Setting and Procedures

The study was implemented in two general education mathematics classrooms. The research team was approached by a general education math teacher who was struggling to engage students with and without disabilities in inclusive, Algebra classes. After joint discussions and planning, a decision was made to pilot the use of the SDLMI in the two classes. Prior to study implementation, human subjects approval was obtained from the university Institutional Review Board (IRB), as well as permission from the suburban school district. A waiver of informed consent process was approved by IRB, and consistent with this approval the research team distributed a letter to parents/guardians at least two weeks before data collection began explaining the purpose of the study with information for parents/guardians on how to contact the research team if they did not want their children to participate in the study. The research team also obtained verbal assent from all students.

In the two Algebra classes, SDLMI lessons (described subsequently) were overlaid on the traditional Algebra curricula implemented by the general education teacher. Specifically, 15-minute lessons were delivered twice a week at the beginning of the class period. The lessons were customized to focus on goal setting and attainment associated with the Algebra curricula. The intervention was implemented over an academic semester (approximately 16 weeks). A member of the research team implemented the SDLMI in the first Algebra class period and the teacher implemented the SDLMI in the second Algebra class period, after observing implementation by the researcher during the first period.

Intervention

The SDLMI is divided into three distinct phases of instruction: Set a Goal (Phase 1), Take Action (Phase 2), and Adjust Goal or Plan (Phase 3). Each phase presents a problem that students must solve by answering four Student Questions that intend to teach students how to self-regulate action to reach self-selected goals. Each Student Question is linked with Teacher Objectives that guide or serve as a "road map" for teachers. To meet the Teacher

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

Objectives, teachers utilize Educational Supports that enable students to solve the problem stated in the Student Questions. Teachers, using the Teacher Objectives and Educational Supports, enable students to work through the questions and learn the self-regulated problem solving process that leads to a goal related to the content area upon which the SDLMI is being overlaid (in this case, Algebra). For example, in Phase 1, teachers use Educational Supports, such as student self-assessment, to meet the Teacher Objective of enabling students to identify specific strengths and instructional needs. During Phase 2, teachers support students to work through the Student Questions to implement an action plan to meet the identified goal from Phase 1. A Teacher Objective in Phase 2 is to enable students to self-monitor progress toward goal attainment, and a teacher could use the Educational Support of self-monitoring instruction to teach the class how to use a self-monitoring sheet to record their progress each day. In Phase 3, teachers enable students to work through the Student Questions to self-evaluate their progress toward their goal using self-monitoring data and decide whether they have attained their goal and are ready to repeat the SDLMI process with another goal or should consider adjustments to the identified goal for various reasons (e.g., lack of specificity of the goal, scope of goal was too large). For more information on SDLMI implementation, see Shogren, Wehmeyer, and Burke, et al. (2017).

In the Algebra classes, after a session introducing the SDLMI and explaining the goals and objectives of the semester (i.e., learn to meet math-related, self-selected goals), the researcher and teacher led two sessions that discussed key terms related to using the SDLMI (e.g., problem, barrier, goal) and described the roles of the student (i.e., self-directed and active learner) and teacher (i.e., facilitator, instructor, and advocate). The classes then spent three weeks working through the SDLMI lessons, organized around the 12 student questions (four per phase) in the model, with the focus on setting a goal in an area of the students' choosing (e.g., social, leisure) to familiarize students with the model and increase student engagement and interest. After completing the initial goal, the SDLMI instruction was repeated with the focus shifting to an Algebra content goal. As such, the students worked on two goals over an academic semester (i.e., 16 weeks); however, data was only collected on the second goal, which was related to math.

To accommodate implementation of the SDLMI with the entire class, as opposed to small group or one-on-one instruction as the SDLMI has been implemented in other studies (Wehmeyer et al., 2012), as well as to support students in identifying potential goals – the research team member worked with the teacher to identify several general goals that were linked to student success in the Algebra class. During SDLMI instruction, these goals were shared with students and used as examples of possible goals. Students were able to select and expand on the goal most related to their learning needs as they worked through Phase 1 of the SDLMI. These goal areas included: preparedness (e.g., making sure to have paper, pencils, and math book before coming to class); note-taking (e.g., increasing the quality or quantity of notes); and content area specific goals (e.g., underlining directions, circling key information). Educational Supports were linked to teaching skills that would be needed to achieve the selected goals. Figure 1 provides a sample of the Educational Support used to teach goal setting skills used during Phase 1 to support students to create a goal for what they wanted to accomplish or achieve and answer the student problem of Phase 1: What is my goal?

Measures

Self-determination. The pilot version of the *Self-Determination Inventory*: *Student-Report* (SDI:SR; Shogren et al., 2014), was used to measure self-determination before and after implementation of the SDLMI (i.e., at the beginning and end of the semester term). The 51-item pilot version of the SDI:SR was designed to be appropriate for self-report by youth with and without disabilities aged 13 to 22 and scores can be calculated for overall self-determination, as well as its three essential characteristics (volitional action, agentic action, and action-control beliefs) and associated component constructs (autonomy, self-initiation, pathways thinking self-direction, control-expectancy, psychological empowerment, and self-realization). Construct and factorial validity of the items of the pilot version of the SDI:SR were examined through a series of confirmatory factor analyses (CFAs) and model fit of a two-group CFA model across the disability and no disability groups was acceptable: χ^2 (34) = 63.861, RMSEA = .075, CFA = .976, TLI = .960,

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

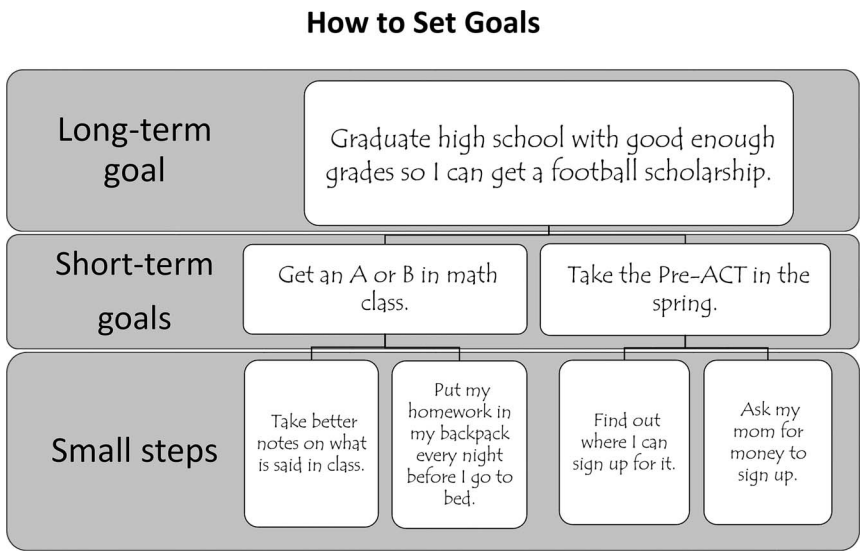

Figure 1. Example educational support used during goal-setting instruction.

and SRMR = .038; Shogren, Wehmeyer, Palmer et al., 2017). The pilot version of the SDI:SR demonstrated acceptable or very near levels of internal consistency with coefficient alpha and omegas reliability indices for adolescents with disabilities (ranging from .71 to .87) and without disabilities (ranging from .69 to .85; Shogren, Wehmeyer, Palmer et al., 2017). In the present study, all participants completed the SDI:SR using an online platform through which they were directed to answer each item on a slider scale with the anchors "Agree" and "Disagree" with a possible range of responses spanning 0 to 99. The SDI:SR took participants approximately 10 minutes to complete and included embedded accessibility features, such as in-text definitions and audio playback.

Goal attainment. Data on the students' goal attainment was collected using *Goal Attainment Scaling* (GAS; Kiresuk, Smith, & Cardillo, 1994), which has been extensively used to measure progress toward meeting goals. GAS involves establishing goals and specifying a range of outcomes that would indicate student progress toward achieving goals. After setting goals at the end of Phase 1 of the SDLMI and with the support of the researcher and teacher, students established five outcomes for their goals. Scores attributable to each outcome were −2 for *much less than expected*, −1 for *less than expected*, 0 for the *expected outcome*, + 1 for *more than expected*, and + 2 for *much more than expected*. After completing Phase 3, the researcher and teacher initiated small- and large-group discussions to facilitate self-evaluation of goal attainment and enabled students to select the outcome description that accurately described their goal attainment. Raw GAS scores can be converted to equally-weighted, scaled scores with a mean of 50 and a standard deviation of 10. An acceptable outcome score is 50, scores of 40 or less indicate outcomes less than desired were achieved, and scores of 60 and above indicate that the student's progress exceeded expectations (Kiresuk et al., 1994).

Social validity. The research team also collected social validity data on students' perspectives of the SDLMI using a brief questionnaire created for the purposes of this study. Participants completed the questionnaire following each SDLMI lesson (i.e., approximately two per week). One question asked students to rate their level of satisfaction with the lesson on a scale of 0 (completely dissatisfied) to 10 (completely satisfied). Subsequent questions were open-ended and asked students to write what they thought went well during a particular lesson, aspects they would like to see change before the next lesson, and how they felt about their progress on their goals so far. Information was also collected from the teacher during an interview following the implementation of the SDLMI and included questions about the extent to which the teacher observed change in student outcomes and teaching strategies, and overall benefits and challenges

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

of using the SDLMI with students with and without disabilities.

Fidelity of implementation. The research team member who implemented the SDLMI in the first class self-reported fidelity of implementation at the end of each phase of the SDLMI, using a fidelity rating scale based on the Student Questions of each phase of the model. Fidelity of implementation was measured by the degree to which the research team member enabled students to answer the Student Questions from *not at all* (0) to *completely* (3). In addition, the research team member indicated the level of use of the Educational Supports per Phase using the same scale. Across Phases, the mean fidelity of the research team member's implementation was 90%. Fidelity of implementation of Phase 1 (Set a Goal) was the highest at 96% while Phase 3 (Adjust Goal or Plan) was the lowest at 83%. No fidelity data was collected from an independent observer, nor was data collected on teacher implementation.

Research Design and Data Analysis

Design. The study used a one-group, pretest-posttest design (Mertens, 2014), and combined the data from students across the two classes for analysis. This quasi-experimental design was selected due to the inability to include a control group because of the demands of the context and randomly assign participants to groups. Efforts to minimize the effects of common threats to validity associated with this design (e.g., instrumentation, maturation effects) included selecting measurement tools with strong reliability and validity and assessing before and after intervention.

Data Analysis. Data were analyzed using SPSS version 22.0 (2013). Descriptive statistics were calculated for pretest and posttest self-determination scores broken down by essential characteristics and component constructs. Paired-samples *t*-tests were conducted to examine the significance of the change in self-determination (overall and by essential characteristics) at pretest and posttest. Effect sizes (Cohen's *d*) were computed by dividing the mean change scores from pretest to posttest by the pooled standard deviation (i.e., $\sqrt{(SD_2^2 - SD_1^2) / 2}$) to quantify the magnitude of change between pretest and posttest. Magnitude of effect was interpreted as either small (0.2), medium (0.5), or large (0.8) based on criteria established by Cohen (1988). In addition to frequency data on the level of goal attainment, GAS mean score and standard deviation was computed for the overall group. The mean and standard deviation of the level of satisfaction indicated on the social validity questionnaire was also computed across participants. Each student completed approximately seven questionnaires over the course of the intervention and variation in this number is mainly due to individual student absences.

Results

Table 2 reports the descriptive statistics and results of the paired-samples *t*-tests, including computations of Cohen's *d*. The mean change score was positive across overall, essential characteristic, and component construct scores with the exception of the self-realization component construct. There was not, however, a significant difference in overall SDI:SR scores from pretest ($M = 75.58$, $SD = 11.882$) to posttest ($M = 77.46$, $SD = 14.374$) conditions; $t(33) = 0.38$, $p = .707$), and this trend continued for change scores at the essential characteristic level of analysis (Volitional Action: $t(33) = 0.60$, $p = .553$; Agentic Action: $t(33) = -0.11$, $p = .910$; Action-Control Beliefs: $t(33) = 0.90$, $p = .376$). The effect sizes for the change in SDI:SR overall and essential characteristic scores were small, based on Cohen's (1988) criteria mentioned previously. The largest effect size reported was the change in Volitional Action ($d = 0.22$), largely attributed to the change in mean scores of Autonomy, and smallest effect size was the change in Agentic Action ($d = 0.02$). The effect sizes reported above suggest that implementation of the SDLMI had an effect on student self-determination, but the magnitude of the impact was small. The mean GAS score was 55.00 ($SD = 8.257$) and 91.2% of the goal attainment scores were 50 or higher on the GAS scale, indicating an acceptable outcome for almost all goals set by students (see Table 3). The highest frequency goal attainment scores were at the "expected" (score of 0; 35.3%) and "somewhat more than expected" (score of + 1; 50.0%) levels, and only 8.8% of goal attainment was identified as "somewhat less than expected" (score of - 1) and "much less than expected" (score of - 2). Goal attainment percentages indicate that more students met or exceeded their self-set criteria related to the math goals than failed to meet them over the course of the academic semester.

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

Table 2
Contrast of Time 1 With Time 2 For SDI:SR Overall, Essential Characteristic, and Component Characteristic Scores

	Time 1		Time 2				95% CI		
	M	*SD*	*M*	*SD*	*t*(33)	*p*	LL	UL	Cohen's *d*
Overall	75.58	11.882	77.46	14.374	0.38	.707	−3.89	5.67	0.14
Volitional Action	78.42	12.505	81.92	18.283	0.60	.553	−4.46	8.19	0.22
Autonomy	77.99	15.302	84.11	17.469					
Self-Initiation	79.15	20.745	79.72	20.745					
Agentic Action	80.07	12.635	80.38	16.426	−0.11	.910	−5.87	5.25	0.02
Pathways Thinking	81.29	14.637	81.31	16.537					
Self-Direction	80.92	12.620	81.60	15.143					
Action-Control Beliefs	75.16	17.264	78.50	16.700	0.90	.376	−3.00	7.70	0.20
Control-Expectancy	72.22	20.079	77.35	19.569					
Psychological Empowerment	75.82	14.994	80.02	15.683					
Self-Realization	78.58	19.200	78.14	18.552					

Remarks by the students and their teacher served as an indication of their perception and it should be noted that these are their opinions rather than measured information. The mean of student-rated satisfaction with the SDLMI lesson was 7.42 (*SD* = 2.022), suggesting moderate satisfaction with the lessons. When asked what they thought went well during a particular lesson, student responses included, "I liked sharing with a partner because I could tell them what I'm doing." and "The examples of goals helped me decide things I could work on." Responses on the second open-ended question, or aspects students wanted to see change before the next lesson, was used as constructive feedback and helped shape the format of subsequent lessons. Student responses to this question included, "More time to talk in small groups." and "Having everyone talk about their goals." When asked how they felt about their progress so far, students indicated, "I think I am making progress on my goal." and "I know I'm going to reach my goal because I'm trying." Additionally, at the culmination of Phase 3, students were asked to answer the question, "How did I feel about the results?" Out of 34 students, 24 reported positive results while 9 did not answer the question and 1 was unsure at the time. How students felt about the results related to their math knowledge (e.g., "Good, I understand word problems better."), confidence (e.g., "I'm proud that I improved."), academic achievement (e.g., "It worked because I got my grades up."), and self-knowledge (e.g., "Good, I think this kind of goal setting works for me.")

During an interview at the end of the intervention, the general education teacher indicated that she observed changes in students: "When we started the [SDLMI] process, they were engaged and I think it had to do with the fact that they were making their own personal goals." In terms of outcomes related to academics, she indicated, "They started to take notes more, and they tried the strategies that they came up with to improve their grades. And their grades improved – I'm so excited!" The teacher also shared her perception of the greatest benefit ("students taking initiative on their own and it wasn't me directing all the time") and challenge ("using the language

Table 3
GAS Scores

Level description	Standardized *t*-score	Frequency	Percent
Much less than expected	30	1	2.9%
Somewhat less than expected	40	2	5.9%
Expected	50	12	35.3%
Somewhat more than expected	60	17	50.0%
Much more than expected	70	2	5.9%

DOI: 10.1352/2326-6988-6.3.164

related to self-determination, and using the vocabulary or explaining the vocabulary sometimes") of implementing the SDLMI with students with and without disabilities.

Discussion

This study expands research on the implementation of the SDLMI to an inclusive secondary Algebra classroom, and suggests that general educators can potentially implement the SDLMI with students with and without disabilities, leading to students achieving self-selected goals related to core content. This provides preliminary support the assertion by Shogren, Wehmeyer, and Lane (2016) that the SDLMI can be implemented classwide as a potential Tier 1 intervention with students with and without disabilities if the school adopts the SDLMI as a schoolwide intervention. In the following sections, we further explore the implications of the results as well as describe limitations to the study.

Impact of the SDLMI on Self-Determination and Goal Attainment

Although the findings suggest that students were able to set and achieve goals with the SDLMI over the 16-week semester, we did not find significant changes in self-determination scores, but small effect sizes were detected. This is consistent with previous research that suggests that ongoing, repeated exposure to instruction supportive of self-determination is needed to enhance outcomes (Wehmeyer et al., 2012). For example, in studies with students with disabilities, up to two years have been needed to detect changes in self-determination scores. However, when looking at specific component construct scores, as assessed by the SDI:SR, the high mean score change in Autonomy suggests that there were potentially initial changes in student self-determination that may lead to greater overall changes in self-determination over time. The change in Autonomy scores aligns with the content of Phase 1 of the SDLMI in which teachers support students to explore their interests, preferences, and learning needs in relation to the core curriculum area. It may be that, given the limited period of instruction, that students made greater gains in these skills than those taught in later phases of the model, including action planning and self-evaluation. This is supported by the lower mean-level change in Agentic Action constructs, which are more aligned with Phase 2 of the model, specifically learning to develop an action plan to achieve one's goals. Further research is needed both to align instruction across SDLMI phases with constructs assessed with the SDI:SR, as well as to explore the developmental trajectory of change in self-determination scores aligned with intervention. For example, do changes in Autonomy and Volitional Action emerge earlier in the instructional process? Is there a certain level of change in Autonomy required to begin to see skills taught later in the model to demonstrate change in other essential characteristics and component constructs? Additionally, future work where students have more sustained (e.g., entire academic year) opportunities to progress through Phases 1, 2 and 3 of the model are needed, particularly to explore changes in Action-Control Beliefs, which occur with repeated opportunities to develop a connection between one's actions and outcomes. Furthermore, a pilot version of the SDI:SR was used in this study, and future research is needed using the revised and newly validated version of the scale that was developed to be more sensitive to changes over time.

The findings from GAS support the hypothesis that students with and without disabilities can set and attain academic goals in inclusive, general education classrooms using the SDLMI and with the support of their general education teacher. The vast majority of students (91.2%) reported attaining expected or higher levels of academic goal attainment, which was supported by social validity data of the general education teacher's observations of impacts on goal attainment. As Lehr, Johnson, Bremer, Cosio, and Thompson (2004) suggested, interventions, like the SDLMI, are successful when the focus is centered on students' strengths and developing the best fit between the student (e.g., high school student with or without disabilities) and school environment (e.g., general education classroom). Strategies, including providing students with goal areas identified by the teacher that they could select from based on their learning needs should be further explored, particularly in the context of implementing instruction in general education classrooms as students, particularly at the secondary level, may need support to initiate the process of self-identifying relevant academic goals linked with achievement in the curricular area. This process of self-identification of goals may be supported by the preliminary practice lessons that guided students

DOI: 10.1352/2326-6988-6.3.164

through the SDLMI process with a nonacademic-related goal; however, more research is needed that explores the most effective and impactful strategies to support student engagement and buy-in of the model in general education settings, particularly when implementing instruction with students with and without disabilities simultaneously. Additionally, research is needed that explores supplemental and more intensive supports for students who struggle with engagement. Barriers to goal attainment for some students included restrictions on the time students were given to plan and implement their action plans, and the overall novelty of the SDLMI and consequent likely occurrence that students did not appropriately select goals and associated criteria their first time using the SDLMI. Further, Eisenman and Chamberlin (2001) surveyed various stakeholders (e.g., parents, school staff) on intervention related to self-determination and one of the emergent themes centered on encouraging institutional learning, not just student learning, to increase the capacity of schools to effectively promote self-determination within existing programs and instructional environments of all students. Therefore, ways to provide more individualized supports for students that encountered these barriers in the general education context is needed to enable teachers and administrators to effectively promote self-determination across the entire school.

Student and Teacher Perceptions of the SDLMI

In addition to the trends in self-determination scores and the positive GAS findings, given the preliminary nature of this line of research, exploring the perceptions of students and teachers on the SDLMI implementation is critical. Social validity information provides further evidence of the degree to which students with and without disabilities and their teacher benefited from using the SDLMI, and the level of self-reported student satisfaction suggests that students were satisfied with the SDLMI lessons overall; however, the open-ended questions provided information on how future implementations of the SDLMI in a whole-class model can be improved (e.g., integrate more time to share goals and action plans with peers in small groups). These responses also suggest potential future research directions, such as exploring peer support concepts in implementing the SDLMI. As interventions designed to improve peer interactions of students with disabilities have suggested, strong contributions to social and emotional development and subsequent success in school (Carter, Sisco, Chung, & Stanton-Chapman, 2010), an examination of the benefits of including peer interaction strategies in addition to the SDLMI on skills associated with self-determination is needed. For example, could peers work together to set goals that support action planning and implementation, and would this be more effective? Further, the teacher's perception of the impact of the SDLMI in her classroom expressed during the post-implementation interview suggests the utility of the SDLMI in inclusive contexts by general education teachers. Based on her direct quotes, using the SDLMI in her classrooms not only improved student outcomes (e.g., grades, engagement), but also her own teaching strategies and overall practice. More research is needed on instructional strategies that teachers use related to self-determination that make a difference on overall teaching practices. Also, the teacher decided to continue to implement the model without the support of the research team and extend instruction across all of classes (not just Algebra), and utilized the SDI:SR assessment to collect data to inform her understanding of her student's initial levels of self-determination and ways to continually support them through her instruction.

Limitations

Several limitations must be noted when interpreting the results of this study, and should be considered in future research and practice efforts. First, this study involved a small sample of students without a control group, which limits the ability to determine causality of the intervention and reported outcomes. This limitation necessitates future research to generalize these findings and determine differential outcomes with a broader population of students with and without disabilities in inclusive contexts. As such, future research should replicate this study with a sample that includes more students with disabilities to validate these preliminary findings. Relatedly, the lack of racial/ethnic diversity of the sample is a limitation that should be addressed in future replications. Second, the pilot version of the SDI:SR was used, as the final version of the tool was not yet available at the start of the study, and future research should explore the degree to which the final version of the scale is sensitive enough to detect differences in self-determination over time in general education contexts. Third, the GAS process should

DOI: 10.1352/2326-6988-6.3.164

ideally also be completed by a third-party observer who assesses a student's current level of performance, assigns outcomes levels, and determines goal attainment without influence from the teacher or students. In this study, the students completed the GAS process in its entirety with support from the teacher and researcher, limiting the objectivity of the data collected on goal attainment. While it is a strength in that students were engaged in the process, future research should consider ways that third-party observers could also report on goal attainment and explore similarities and differences in student and third-party observers' ratings. Similarly, because the researcher asked the student and teacher participants the social validity questions, the remarks could be biased. A recommendation for future research is to continue to collect social validity on student and teacher perspectives to generate evidence of stakeholders' perceived effects of the SDLMI. Fourth, the short timeline of the study presented multiple limitations, including fewer opportunities for students to develop skills associated with self-determination, less time for students to implement action plans related to self-selected goals, and fewer chances for the teacher and researcher to collaborate on effective and responsive implementation of the SDLMI. Finally, future research should explore ways that teacher-reported fidelity of implementation of SDLMI can be collected when implementation is with the whole-class in inclusive, general education classrooms.

Conclusion

Even with the aforementioned limitations, the positive findings, particularly related to goal attainment and social validity, provide support for ongoing research on the implementation of the SDLMI in general education classrooms, by general education teachers. Further work is needed specifically exploring the possibilities of collaborative instructional opportunities between general and special educators in inclusive classrooms, as well as the most effective implementation supports for teachers, and the design of more intensive supports for students that need more individualized instruction in using the SDLMI when implemented class-wide. Additionally, investigations on the effects of whole-class implementation of the SDLMI in inclusive classrooms on academic achievement and teacher efficacy would strengthen the claim put forth by these preliminary findings. Overall, however, these preliminary findings suggest the potential of the SDLMI when used classwide as a Tier 1 intervention to support all students, including students with disabilities, to reach academically-relevant goals through a self-regulated, problem solving process. To conclude, the general education teacher's final advice to others thinking about using and implementing the SDLMI encompasses many of the future directions identified in this study: "You can learn. It just takes time."

References

Agran, M., Blanchard, C., Wehmeyer, M., & Hughes, C. (2001). Teaching students to self-regulate their behavior: The differential effects of student-vs. teacher-delivered reinforcement. *Research in Developmental Disabilities*, *22*(4), 319–332. doi: 10.1016/s0891-4222(01)00075-0

Agran, M., Cavin, M., Wehmeyer, M., Palmer, S. (2006). Participation of students with moderate to severe disabilities in the general curriculum: The effects of the Self-Determined Learning Model of Instruction. *Research and Practice for Persons with Severe Disabilities, 31*(3), 230–241. doi: 10.1177/154079690603100303

Carter, E. W., Sisco, L. G., Chung, Y., & Stanton-Chapman, T. L. (2010). Peer interactions of students with intellectual disabilities and/or autism: A map of the intervention literature. *Research & Practice for Persons with Severe Disabilities, 35*(3-4), 63–79. doi: 10.2511/rpsd.35.3-4.63

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Lawrence Erlbaum Associates. doi: 10.4324/9780203771587

Eisenman, L. T., & Chamberlin, M. (2001). Implementing self-determination activities: Lessons from schools. *Remedial and Special Education*, *22*(3), 138–147. doi: 10.1177/074193250102200302

Joyce, B., & Weil, M. (1980). *Models of teaching* (2nd ed.). Englewood Cliffs, NJ: Prentice Hall.

Kiresuk, T. J., Smith, A., & Cardillo, J. (1994). *Goal attainment scaling: Applications, theory, and measurement*. Hillsdale, NJ: Lawrence Erlbaum.

Kleinert, J. O. R., Harrison, E., Mills, K. R., Dueppen, B. M., & Trailor, A. M. (2014). Self-determined goal selection and planning by students with disabilities across grade bands

©AAIDD
DOI: 10.1352/2326-6988-6.3.164

and disability categories. *Education and Training in Autism and Developmental Disabilities*, *49*(3), 464–477.

Lee, S. H., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., & Little, T. D. (2008). Self-determination and access to the general education curriculum. *Journal of Special Education, 42*(2), 91–107. doi:10.1177/0022466907312354

Lehr, C. A., Johnson, D. R., Bremer, C. D., Cosio, A., & Thompson, M. (2004). Increasing rates of school completion: Moving from policy and research to practice. Minneapolis: University of Minnesota, National Center on Secondary Education and Transition.

Mertens, D. M. (2014). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods* (4th ed.). Thousand Oaks, CA: SAGE Publications.

Morningstar, M. E., Bassett, D. S., Kochhar-Bryant, C., Cashman, J., & Wehmeyer, M. L. (2012). Aligning transition services with secondary education reform: A position statement of the Division on Career Development and Transition. *Career Development and Transition for Exceptional Individuals*, *35*(3), 132–142. doi: 10.1177/2165143412454915

Shogren, K. A., Palmer, S. B., Wehmeyer, M. L., Williams-Diehm, K., & Little, T. D. (2012). Effect of intervention with the Self-Determined Learning Model of Instruction on access and goal attainment. *Remedial and Special Education*, *33*(5), 320–330. doi: 10.1177/0741932511410072

Shogren, K. A., Wehmeyer, M. L., Burke, K. M., & Palmer, S. B. (2017). *The self-determination learning model of instruction: Teacher's guide*. Lawrence, KS: Kansas University Center on Developmental Disabilities.

Shogren, K. A., Wehmeyer, M. L., & Lane, K. L. (2016). Embedding interventions to promote self-determination within multitiered systems of supports. *Exceptionality*, *24*(4), 213–224. doi: 10.1080/09362835.2015.1064421

Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Forber-Pratt, A., Little, T. J., & Lopez, S. J. (2014). *Self-Determination Inventory: Student-Report [Pilot Version]*. Lawrence, KS: Kansas University Center on Developmental Disabilities.

Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Forber-Pratt, A., Little, T. J., & Lopez, S. (2015). Causal agency theory: Reconceptualizing a functional model of self-determination. *Education and Training in Autism and Developmental Disabilities*, *50*(3), 251–263.

Shogren, K. A., Wehmeyer, M. L., Little, T. J., Forber-Pratt, A., Palmer, S. B., & Seo, H. (2017). Preliminary validity and reliability of scores on the Self-Determination Inventory: Student Report version. *Career Development and Transition for Exceptional Individuals*, *40*(2), 92–103. doi:10.1177/2165143415594335

Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. E. (2000). Promoting causal agency: The self-determined learning model of instruction. *Exceptional Children*, *66*(4), 439–453. doi: 10.1177/001440290006600401

Wehmeyer, M. L., Shogren, K. A., Palmer, S. B., Williams-Diehm, K. L., Little, T. D., & Boulton, A. (2012). The impact of the self-determined learning model of instruction on student self-determination. *Exceptional Children, 78*(2), 135–153. doi:10.1177/001440291207800201

Received 9/12/2017, accepted 12/9/2017.

The corresponding author would like to thank her doctoral advisor and mentor, Dr. Karrie A. Shogren, for her guidance and support in developing this manuscript.

Authors:
Sheida K. Raley and **Karrie A. Shogren,** University of Kansas; and **Annette McDonald,** Lawrence Public Schools, Kansas.

Correspondence concerning this article should be addressed to Sheida K. Raley, University of Kansas, Kansas University Center on Developmental Disabilities, 1200 Sunnyside Avenue, Room 3125, Lawrence, KS 66045 (e-mail: raley@ku.edu).