Inclusion

Goal Setting and Attainment in General Education Classes: Examining the Role of Self-Determined Learning

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Abstract:	Developing goal setting and attainment skills is essential for enabling self-determined learning. This study examined how secondary students with and without disabilities set and pursued academic goals in general education mathematics classrooms using the Self-Determined Learning Model of Instruction (SDLMI). The sample included 118 students, four (3%) self-reporting a disability. Across one academic year, students self-reported their goal attainment using Goal Attainment Scaling (GAS) rubrics. A directed content analysis was used to examine the types of academic goals. The quality of goal statements and GAS rubrics was evaluated using the SMART framework, and multilevel linear modeling was used to examine the relationships between academic goal types, goal statement quality, GAS rubric quality, and students' goal attainment across two semesters. Results indicated that students were able to set and attain high quality academic goals, reflecting a focus on building strategies for academic success and advancing academic outcomes across two semesters of the implementation of the SDLMI. Limitations and implications related to inclusive goal setting, supports, and opportunities for students with disabilities are discussed, along with directions for future research and practice.

Abstract

Developing goal setting and attainment skills is essential for enabling self-determined learning. This study examined how secondary students with and without disabilities set and pursued academic goals in general education mathematics classrooms using the Self-Determined Learning Model of Instruction (SDLMI). The sample included 118 students, four (3%) self-reporting a disability. Across one academic year, students self-reported their goal attainment using Goal Attainment Scaling (GAS) rubrics. A directed content analysis was used to examine the types of academic goals. The quality of goal statements and GAS rubrics was evaluated using the SMART framework, and multilevel linear modeling was used to examine the relationships between academic goal types, goal statement quality, GAS rubric quality, and students' goal attainment across two semesters. Results indicated that students were able to set and attain high quality academic goals, reflecting a focus on building strategies for academic success and advancing academic outcomes across two semesters of the implementation of the SDLMI. Limitations and implications related to inclusive goal setting, supports, and opportunities for students with disabilities are discussed, along with directions for future research and practice.

Keywords: self-determination, goal setting, goal attainment, academic outcomes, inclusive education, intervention research.

Goal Setting and Attainment in General Education Classes: Examining the Role of Self-Determined Learning

Developing goal setting and attainment skills is essential for student success, particularly in enhancing self-determination (Shogren & Raley, 2022). There is a strong emphasis on providing inclusive opportunities and supports to enhance self-determination skills and abilities, including self-regulated goal setting for students with and without disabilities (Shogren et al., 2016). Researchers have advocated for systematic supports for self-determination aligned with Multi-Tiered Systems of Supports frameworks (MTSS), based on an understanding that some students may need more intensive supports to develop goal setting and attainment abilities. Within a MTSS framework, Tier 1 supports for self-determination are provided universally to all students, Tier 2 supports are offered to students who need more targeted supports, and Tier 3 supports are highly individualized (Shogren et al., 2016; Lane et al., 2020). However, the majority of research on interventions designed to promote self-determination skills, such as the *Self-Determined Learning Model of Instruction* (Shogren & Raley, 2023), has occurred within special education supports and services in ways more aligned with Tier 2 or 3 interventions rather than universal interventions (Matusevich et al., 2025). The purpose of this study, therefore, is to examine how the SDLMI can be implemented as a Tier 1 support in general education classrooms with students with and without disabilities to enhance goal setting and attainment outcomes.

Self-Determined Learning Model of Instruction

The SDLMI enables teachers to support students in learning self-regulated problem-solving, goal setting, and attainment skills (Shogren & Raley, 2023). Self-determination researchers have examined the impact of the SDLMI on student self-determination and goal attainment outcomes, providing strong evidence of its effectiveness across various learning domains, including academic and transition planning instruction (Shogren & Raley, 2023). Rooted in Causal Agency Theory (Shogren & Raley, 2022), the SDLMI emphasizes the importance of repeated supports and opportunities to enhance the development of self-determination skills in ways aligned with individual student needs and strengths. Unlike traditional teacher-directed approaches, the SDLMI centers students as learning leaders. The SDLMI has three core components (Student Questions, Teacher Objectives, and Educational Supports) integrated across three instructional phases: Phase 1: Set a Goal, Phase 2: Take Action, and Phase 3: Adjust Goal or Plan. In each phase, students engage with four Student Questions (totaling 12 across all phases) that guide them through a self-regulated problem-solving process specific to the phase. Teachers use Teacher Objectives to guide their instruction and support students in answering each student's question. Teachers also deliver Educational Supports as a part of instruction and can tailor the intensity of these supports to meet student and class needs.

Shogren and colleagues (2019) designed the SDLMI Whole Class Implementation Materials to support general or special education teachers in implementing the SDLMI in inclusive general education classes. These materials include 26 lessons, each approximately 15 minutes long, delivered twice weekly throughout the semester. Teachers implement the lessons over a semester, and the lessons can be repeated semester after semester, supporting students to set goals (Phase 1), create and implement action plans (Phase 2), and self-evaluate their progress (Phase 3) repeatedly with new and different goals. During Phase 1 of SDLMI instruction (Set a Goal), students reflect on their interests, values, and learning needs. At the end of Phase 1, in answering Student Question 4, students identify and document (e.g., write, record) their self-selected goal. Instructional materials support teachers in providing instruction on specific, measurable, achievable, relevant, and time-bound (SMART) goals; however, the ultimate goal identified by the students is their own and in their own words. After establishing their goal, in the next lesson, students learn to utilize Goal Attainment Scaling (GAS; Kiresuk et al., 1994) to establish possible levels of attainment as they continue to work toward their goals in Phase 2 (Take Action) and rate their goal attainment in Phase 3 (Adjust Goal or Plan). GAS is a standardized self-reported measure commonly used in the fields of education and disability. Using GAS, students identify five differentiated attainment levels, ranging from “much less than expected” to “much more than expected.” Teachers use instruction materials that support students to learn and apply the SMART goal framework to establishing GAS rubrics. Best practices in ensuring student self-directed goal reliability, validity, and interpretability and GAS rubrics are embedded into SDLMI instruction. For example, the SDLMI includes instructional materials that guide students in creating specific, measurable, and time-bound goals and in defining clear levels of attainment aligned with GAS (Shogren, Dean, et al., 2021).

Prior research shows that the SDLMI effectively supports students with and without disabilities in setting goals, developing GAS rubrics, and evaluating their progress using GAS in school-based settings (Shogren et al., 2025; Shogren, Hicks, et al., 2021). For example, Raley et al. (2022) found that most of the 774 self-directed goals set by students in the first semester of using the SDLMI in inclusive academic content classrooms focused on academic learning with a primary focus on improving grades and academic achievement. While some studies have examined the types of goals students set during special education services and supports (e.g., Burke et al., 2021), no research has jointly examined the types of academic goals students set, the quality of those goals and their associated GAS rubrics, and how these factors relate to academic goal attainment within general education classrooms — an area explored in this study.

We build on a multi-year partnership between a high school and local university researchers (e.g., Alsaeed et al., 2024; Raley et al., 2020) by examining goals students set using the SDLMI in general education mathematics classrooms. Specifically, we investigated: (1) the types of academic learning goals set by students in general secondary mathematics classrooms, including whether they aligned with math-specific skills or general academic skills, and how they changed across semesters; (2) the overall quality of students' goal statements and GAS rubrics; and (3) students' self-reported academic goal attainment and its relationship with goal type, goal statement quality, and GAS rubric quality.

Method

Participants and Setting

We utilized student-level data from the 2018-2019 academic year from students who engaged in SDLMI instruction delivered by two mathematics teachers at a suburban high school in the Midwest. One teacher, who began integrating the SDLMI into her mathematics classes in the 2016-2017 academic year, expanded it to all her classes in the 2018-2019 academic year; another teacher in the mathematics department also implemented it across her classes in 2018-2019. Thus, our sample was generated as part of an ongoing SDLMI implementation initiative in the mathematics department rather than being designed for direct group comparisons (see Limitations section). A total of 138 students were enrolled across six mathematics classes (i.e., Algebra II, Pre-Calculus, and AP Calculus). Of those, we analyzed data from 118 students. Students (n = 20; 14%) were excluded from the analysis if they (a) only participated in math for one semester, (b) moved to a class that did not implement the SDLMI, or (c) withdrew from the project. These 118 students (86%) consistently participated in the SDLMI across both semesters, setting 236 goals and associated GAS rubrics. Table 1 provides self-reported demographic information for the 118 students. The majority reported being enrolled in 11th grade (n = 73; 63%), and there were 64 (54%) female and 47 (39%) male identifying students. Most students identified as White/European American (n = 81; 67%), and most students reported not having a disability (n = 114; 97%). Unfortunately, we did not have access to administrative data, only self-reported demographics. While the teachers reported that more students with Individualized Education Programs (IEPs) were enrolled in their classes, we had to rely on student-self-reported disability status. The university IRB and school district approved the project.

SDLMI Implementation

The two teachers received standardized training and guided practice on implementing the SDLMI in their classes. They learned how to use the SDLMI Whole Class Implementation Materials (Shogren et al., 2019), which includes 26 lesson plans and implementation resources (e.g., PowerPoint presentations and worksheets). Within the SDLMI, teachers are trained to serve as autonomy-supportive facilitators, providing guidance and support while ensuring students take ownership of their goals. During initial instruction, teachers focus on enabling students to identify their strengths, set meaningful goals, and develop action plans to achieve them. SDLMI implementation starts with four lessons collectively called "Preliminary Conversations." These initial lessons support students in understanding the SDLMI, defining self-determination, and clarifying key concepts like goals, opportunities, barriers, and supports. These lessons also establish students as self-directed learners and clarify teachers' supportive roles.

Following this introduction, teachers guide students through the 12 SDLMI Student Questions across three phases, emphasizing non-academic goals. This serves as a condensed introductory cycle to familiarize students with the goal-setting process. Subsequently, instruction shifts to academic goals, with students working through the 12 Student Questions again, this time targeting an academic goal. As part of supporting students to identify academic goals, teachers can create “goal buckets” that support students in thinking about different areas important to mathematical learning. These buckets can target mathematics-specific skills or broader skill areas that facilitate learning (Shogren et al., 2019).

In this study, teachers utilized the following goal buckets during instruction: study strategies, note-taking strategies, time management strategies, and test-taking strategies. Test-taking strategies goal bucket was only used during the first semester; the remaining were utilized across both semesters. These goal buckets were based on areas of need identified by the implementing teachers in line with subject or course-specific learning priorities; SDLMI implementation materials guide teachers in how to select and use goal buckets in their instruction to support and guide students in identifying and organizing goals across academic contexts, based on their individual needs. Throughout SDLMI instruction, there is a focus on examples and opportunities for students to learn and practice how to set goals that are observable, specific, and measurable. This instruction was designed to align with the SMART goal framework by supporting students in setting personally meaningful and archivable goals (aligning with the achievable and relevant components of SMART) and guiding them in creating action plans with clear timelines (aligning with the time-bound component). A sample material to support teachers in delivering goal-setting instruction is available in File A1 on Open Science Framework (OSF) project page: https://osf.io/pxdbn/?view_only=44578bf5553d4477a3efd45bffb2eb00.

For example, elements of the SMART framework are embedded in instruction throughout Phase 1. For example, teachers use SDLMI materials to enable students to identify and articulate their strengths, instructional needs, and preferences, which serve as the basis for setting high quality goals and establishing criteria for their attainment. Students select a goal bucket and learn about setting specific, measurable, achievable, relevant, and time-bound goals – all the elements central to the SMART goal framework. As students engage with the SDLMI Student Questions in Phase 1, students explore and identify strengths and areas of growth related to the content (which was mathematics in this study) that students want to improve on or learn more about within one semester. After setting their goal, students move to SDLMI lesson 15 (Set Your Goal Using Goal Attainment Scaling - Part 1). This lesson focuses on teaching students how to utilize Goal Attainment Scaling (GAS; Kiresuk et al., 1994) to define a range of outcomes for their goal. These levels of attainment are used for self-evaluation after completing Phase 3. Teachers support students to ensure each GAS level is measurable, observable, and specific, consistent with student goal focus and its timeline of one semester.

Next, the four Student Questions in Phase 2 (Take Action) guide students in creating and implementing action plans to progress toward their goals. Teachers support students by helping them identify barriers, find solutions to removing barriers, and develop and maintain a way to chart their progress. Finally, students move to Phase 3 (Adjust Goal or Plan), where teachers support students in learning strategies to respond to four Student Questions focused on self-evaluation and self-reflection on their progress toward their goal. This self-assessment process enables students to decide whether they met their goal and want to set a new goal in the next SDLMI cycle or whether they need to adjust their goal or action plan to continue progressing toward the current goal in the next cycle. The cycle concludes with GAS - Part 2, where students rate their goal attainment using the GAS rubric, they developed in Phase 1, celebrate what they have learned, and prepare for the next SDLMI cycle.

Goal Attainment Scaling Measure

In this study, students developed their academic goals and Goal Attainment Scaling (GAS) rubrics with instruction and support from their teachers throughout Phase 1 of the SDLMI, using standardized lesson materials. Students self-reported their goal attainment at the end of Phase 3 using pre-established GAS rubrics. Throughout each SDLMI cycle, students entered their academic goal statements and GAS rubrics into a customized online platform. At the end of Phase 3, they returned to the platform to rate their academic goal attainment using the five-point GAS scale (-2 to +2). Each student's average GAS score was computed using the mean of their ratings across both academic goal cycles to analyze goal attainment.

Data Analytic Procedures

Academic Goals Coding

To examine the types of academic goals students set across semesters, we implemented a systematic coding process using a directed content analysis approach (Hsieh & Shannon, 2005). We used this approach to analyze and classify student goal statements each semester. While the SDLMI was implemented in mathematics classes, the analytic process was designed to capture both mathematics-specific and broader academic goals applicable across subjects, reflecting the flexibility of the SDLMI in promoting transferable learning skills. The coding team involved the first and second authors, who developed and refined the analytic procedures through an iterative process, including regular meetings. An overview of the iterative coding process is shown in Figure S1 OSF project page.

The coding process began with an initial screening to categorize goals as academic learning goals (e.g., focused on math and study skills) or non-academic goals (e.g., focused on career development recreational activities). We coded for non-academic goals because previous research has shown that students may set non-academic goals even when the SDLMI was used in core content areas (Raley et al., 2022). However, we planned to focus only on academic learning goals in subsequent steps. We dichotomously coded all academic goals as either mathematics-specific (i.e., related to mathematics content) or broader academic skills (i.e., general academic strategies that support learning across multiple subjects).

Following this, we used both deductive and inductive approaches to comprehensively identify and categorize the focus areas within academic goals. Deductive coding categorized goals using the predetermined SDLMI goal buckets used by teachers in this study, including study, note-taking, time management, and test-taking strategies. Based on prior research indicating that student goals often reflect more than one focus area (Raley et al., 2022), we allowed a single goal to be coded with multiple focus areas (e.g., study strategies and time management). Each goal was counted once at the goal level, then could be counted in multiple focus areas to capture all relevant focus areas represented in students' goal statements.

We also used inductive coding to categorize goals that did not fit into one of the goal bucket areas. We initially coded goals that did not fit into these predetermined categories as "other." The coding team then met to review and discuss the content classified under "other." We expanded the "other" category to include specific focus areas such as seeking support strategies, organizational strategies, improving academic performance, enhancing understanding of mathematics, and enhancing performance on tests. This discussion revealed patterns that pointed to two broader, overarching goal focus areas across the deductive and inductive codes: a) strategy-based and b) academic outcome-based focuses. All goals were then categorized into one of these areas or as reflecting both. Strategy-based goals included building learning skills such as note-taking, math study, time management, test-taking, seeking support, and organizing. On the other hand, outcome-based goals were directly related to academic outcomes, including improving academic performance, enhancing understanding of math, and enhancing performance on tests.

Finally, we adopted deductive and inductive coding methods to examine changes in student goal statements and specific goal focus areas (strategy-based and academic outcome-focused) across two semesters. Initially, we applied a set of predefined categories to capture common types of changes, such as “completely changing goal focus areas and goal statements” or “keeping the same goals and focus areas.” We also were open to emergent patterns, creating an “other” category that did not fit into our initial codes, allowing us to capture nuanced changes in goal statements. The coding team regularly met to discuss these emerging patterns of change. For example, we discussed how some students partially shifted their strategy but kept their academic focus from one semester to the next. To code and analyze these complexities, we developed detailed coding specifications that included: (a) whether each student’s goals consistently reflected both a strategy and an academic outcome across semesters; (b) multiple strategy and academic outcome areas in their goals across semesters; and (c) whether there was a shift from focusing on either a strategy *or* academic outcome in one semester and both strategy and academic outcome focuses in the following semester. Figure S2 in OSF includes the finalized codebook of changes with a detailed breakdown of these coding categories.

The Quality of student Goal Statements and Goal Attainment Scaling Rubrics

To examine the quality of students’ goal statements and GAS rubrics across two semesters, we used key quality indicators from the SMART goal framework—specific, measurable, attainable, relevant, and time-bound, alongside recommendations from Shogren, Dean, et al. (2021). The evaluation rubrics for goal statements and GAS rubrics were developed by a team of researchers with expertise in SDLMI and assessment development. The development and validation of our evaluation rubrics followed an iterative rubric development and validation approach (DeVellis, 2017), which involved cycles of evaluation rubrics, pilot testing, and inter-rater reliability testing to ensure the validity and reliability of the evaluation rubrics. In refining the GAS evaluation rubric, for example, we integrated specific enhancements to indicators for the Measurability domain, consistent with the recommendations made by Shogren and colleagues (2021). This domain includes three indicators: agreement, unidimensionality, and equidistance. The agreement indicator focuses on whether each criterion within the GAS rubric aligns with the goal statement. Unidimensionality focuses on whether each criterion measures only a single and consistent construct. Equidistance focuses on whether the scoring intervals are consistently spaced and whether they are quantitative or qualitative. Extended examples and non-examples of each quality indicator for the goal statements and GAS evaluation rubrics can be found in Tables S1 and S2 on OSF.

All indicators are rated on a 3-point scale of 0 (No), 1 (Somewhat), and 2 (Yes). In scoring quality, a score for each domain is calculated by averaging indicators, and overall quality scores are calculated by averaging scores across domains. High average scores indicate high quality goal statements and GAS rubrics. In cases where indicators are mutually exclusive, scores are combined within their respective domains to compute the overall quality scores and ensure consistency and appropriate weighting. Only one student had a goal statement and a GAS rubric that were coded on the non-repeatable events indicator in the time-boundness domain (i.e., all other goal statements and GAS rubrics included repeatable events). As we could not calculate an average, we combined the mutually exclusive non-repeatable and repeatable events indicators in our computation of the average scores for the time-boundness domain for goals and GAS rubrics.

Interrater Reliability

Inter-rater reliability (IRR) data were collected to ensure the reliability of all coding procedures. Thirty-three percent of goals were independently coded by two coders for academic goals and quality of goal statements and GAS rubrics. The first author served as the primary coder, and two special education doctoral students served as secondary coders. Coders underwent training, achieving 80% reliability on an external dataset before coding the study data. IRR was calculated as the total number of agreements divided by the total number of coded segments multiplied by 100. The primary and secondary coders met regularly to review coding and discuss discrepancies. IRR results were 100% for initial screening, 90% for math vs. general academic goals, 94% for goal focus areas, 100% for overarching goal types, and 96% for goal statement changes. The agreement was 88% for goal quality and 86% for GAS rubric quality.

A Multilevel Analysis of Academic Goal Attainment Outcomes and Associated Factors

To examine the relationship between goal type, goal statement quality, GAS rubric quality, and students' self-reported goal attainment, we used multilevel linear modeling (MLM), accounting for goal attainment data nested within students across two semesters (Raudenbush & Bryk, 2002). MLM provides an opportunity to explore how level-1 predictors (i.e., type of academic goals, the quality of goal statement, and the quality of GAS levels rubric) explain variability among measurement time points (level-1). We assumed the normality of GAS data and tested the following models: M_1 (empty model), M_2 (effect of goal type; goals aligned with the math subject area versus general academic skills), M_3 (effect of overall goal statements quality), M_4 (effect of overall GAS rubric quality). Model evaluation was guided by Akaike Information Criterion (AIC), and all models were tested using R. The R scripts and de-identified data supporting these analyses are available on OSF.

Results

Academic Goals

The initial coding step was to classify goals as academic or non-academic. All the goals ($n = 236$ goals; 100%) set by students across the two semesters in their mathematics general education classes concentrated on academic learning goals. The second step of coding distinguished between goals specifically aligned with mathematics and those focused on general academic skills that students could apply in their mathematical learning or other subject areas. The majority of goals ($n = 144$; 61%) reflected on general academic skills (e.g., "I will review my notes for 15 minutes the day before every test."), while a subset of the goals ($n = 92$; 39%) focused specifically on math (e.g., "I will study 15 minutes after school for the ACT math section and mark every day I study and how long I studied.") across the two semesters. We found differences in goal focus across semesters. During the Fall Semester, 64 goals (54% of 118 goals) set by students focused on general academic skills, and 54 goals (46%) were specifically aligned with the math subject area. In the Spring semester, there was a greater focus on general academic skills, with 80 goals (68%) reflecting general academic skills applicable to math and other contexts, compared to 38 goals (32%) focused on math.

The next coding step was to examine the focus areas of mathematics and general academic goals. Table 2 provides the frequency of goals focusing on using a strategy or improving an academic outcome across semesters. As noted in the Method section, each goal could be coded to reflect multiple focus areas. Within the strategy area, there were 234 goals. The most common strategy represented in goals was study strategies ($n = 152$; 65 %, e.g., "I will study for at least 30 minutes three days before a test"). The second most frequent focus area was time management strategies ($n = 145$; 62 %; e.g., "My goal is to complete and turn in all of my homework on time by using my planner to write down the assignments and their due dates"). Across both semesters, most goals were coded as focusing on time management and study strategies. We observed small decreases in goals related to seeking support and test-taking strategies between semesters. As shown in Table 2, there were 123 goals that focused on a specific academic outcome across semesters. The most frequent academic outcome was enhancing performance on tests (*n* = 70; 57%; e.g., "learning new study strategies to help me do better on my tests, this included figuring out if I have questions and rewriting my notes"). Across semesters, there was an increased focus on goals that included enhancing performance on tests but a decreased focus on enhancing understanding of math and improving academic performance focus areas. For example, the goals focused on enhancing understanding of math decreased from 25 goals (35%) in the Fall semester to 12 goals (23%) in the Spring semester.

Approximately half of the students wrote a goal that combined a strategy and an academic outcome focus (*n* = 121; 51%; e.g., "Review my notes every day so I am prepared for a test in advance."). Another large subset (*n* = 113; 48%) only focused on specific academic strategies (e.g., work on and develop new study strategies for this class and other classes in my future"), and only two students wrote goals focused on specific academic outcomes only (1%; e.g., "Achieve at least an A- in my precalc [sic] class."). During the Fall, a larger number of students wrote goals that combined a specific strategy and academic outcome focus (*n* = 68; 58%), followed by a specific strategy focus only (*n* = 48; 41%) and a specific academic outcome focus only (*n* = 2; 2%). However, during the Spring, a larger number of students wrote goals focused on a specific academic strategy only (*n* = 65; 55%), followed by combining a specific academic strategy and academic outcome focus (*n* = 53; 45%), and none focused on academic outcomes only.

We finally explored how students changed their goal statements, and goal focus areas across two semesters. Table S3 on OSF provides additional details on the patterns of changes in students' goals across the semesters. Key findings include that 20 students out of 118 (17%) consistently wrote goals that reflected strategy and outcome focus areas each semester, and 17 students (14%) had goals that included multiple strategy and outcome focus areas across semesters. For students that had a change in their strategy and outcomes focus areas, almost all (99%) students changed their academic strategy and/or outcome focus and modified their goals across semesters.

Quality of Students' Goal Statements and GAS Rubrics

The overall mean for goal statement quality was 1.47 (*SD* = 0.27) on a 3.0-point scale (range = 0.00 to 2.00) and remained stable across semesters (Fall: *M* = 1.46; *SD* = 0.28; and Spring: *M* = 1.48; *SD* = 0.26). As shown in Table 3, the achievability and relevance domains were perfectly rated across students, with no variability (*M* = 2.00; *SD* = 0.00). Time-boundness was rated lowest (*M* = 0.44; *SD* = 0.58). The overall mean across domains for GAS rubric quality was relatively high (*M* = 1.53; *SD* = 0.27; range = 0.00 to 2.00) with limited variation between Fall (*M* = 1.53; *SD* = 0.22) Spring (*M* = 1.52 *SD* = 0.30). Table 4 shows that relevancy was the highest rated indicator (*M* = 1.97; *SD* = 0.26), while time-boundness was the lowest (*M* = 0.47; *SD* = 0.51).

Academic Goal Attainment Outcomes and Associated Factors

In terms of goal attainment, 63% of students in the Fall reported attaining their goals at or above expected levels, compared to 59% in the Spring. Conversely, 36% and 41% of students reported attaining their goals less than or much less than the expected level in the Fall and Spring, respectively. Table S4 on OSF details students' self-reported goal attainment across semesters, showing stability in outcomes. Table 5 presents the multilevel analysis of predictors of goal attainment. The intercept-only model (*M*1) provided the best fit based on AIC, with limited improvement when adding the overall quality of goal statements, GAS rubric quality, and goal type.

Discussion

This study contributes to the growing body of research on self-determination interventions in general education classrooms by examining the types and quality of goals and goal attainment rubrics developed by students and their associations with goal attainment outcomes when using the SDLMI in mathematics. The findings advance the knowledge base on how students engage in goal setting and self-regulated learning in general education mathematics classrooms. Although our study included a limited number of students ($n = 4$; 3%) who self-reported a disability status, we highlight several key findings that support and extend existing research and can inform directions for future research and practice on ways to support students with disabilities learning in inclusive general education classrooms through self-determination instruction.

The first key finding is that all students consistently set academically focused goals during SDLMI instruction, aligning with prior work (Raley et al., 2022). Interestingly, we found half of the students included both a strategy (e.g., time management strategies) and an academic outcome focus (e.g., enhancing performance on tests) in their goal statements, showing that they were connecting actions and outcomes being targeted. This is essential, as it reflects a key component of developing self-determined learning skills — understanding the relationship between actions and outcomes — and can increase motivation and ownership over learning. These findings build on and extend prior work by empirically showing how SDLMI implementation enables students to set goals that focus on building learning strategies to achieve specific academic outcomes.

Another important contribution of this study is that most students refined and adjusted their goals across semesters. This is important as it reflects the iterative nature of the SDLMI, where students are provided with repeated opportunities and supports to refine their goals and action plans over time through repeated SDLMI implementation. Students have noted that this is critical in developing self-determined learning skills over time (Alsaeed et al., 2024), and these data confirm students' self-reported perspectives. Additionally, students demonstrated the ability to set high quality goals and develop high quality GAS rubrics aligned with the SMART framework and mostly reported attaining their goals at or above expected levels. These findings support and extend prior research indicating that students can meaningfully engage in SDLMI-driven goal setting and accurately self-rate using GAS (Shogren et al., 2025; Shogren, Hicks, et al., 2021). Importantly, our study adds to this work by suggesting that students sustained high quality goals and GAS rubrics across semesters.

Collectively, these findings support previous research demonstrating how the SDLMI can advance student goal setting and attainment skills (Shogren et al., 2025) and highlight its promise in enhancing learning in mathematics and general education classrooms. Importantly, the findings show how the SDLMI can be implemented in general education settings as a Tier 1 support to advance high quality goal setting and attainment outcomes for all students. Given the identified benefits of the SDLMI for students with disabilities in other settings (Hagiwara et al., 2017), this suggests that adding this support could advance the learning and engagement of students with disabilities in inclusive classrooms, while also identifying where Tier 2 or Tier 3 supports may be needed to further individualize instruction. This is especially relevant for students with intellectual and developmental disabilities and students with complex support needs, who often face limited access to inclusive opportunities that support the development of self-determination skills (Alsaeed et al., 2023). However, our findings, together with prior research discussed above, suggest the relevance and importance of using the SDLMI in general education classrooms for all students and suggest that promoting the use of the SDLMI may be a way to further enhance inclusive opportunities and goal attainment outcomes for students with disabilities, inclusive of students with intellectual and developmental disabilities.

Implications for Research

Building on these findings, future research is needed to explore factors that limit the inclusion of students with disabilities in general education classrooms. This is particularly important to advance our understanding of how the SDLMI can be implemented in inclusive settings to meet the needs of students with disabilities. The small number of students who self-reported a disability limited our ability to examine differences in outcomes, necessitating ongoing research. Such research, however, must also explore the relationship between students' self-perceptions of their disability identities (which we used in this study) and receipt of special education services. Anecdotally, participating teachers reported that approximately 10-20% of students had IEPs in their classes, consistent with district and national data.

Given our findings of a shift in student goal setting focus across semesters, there is also a need to further explore the longitudinal development of goal setting abilities and priorities over time. In the first semester, 64 of the goals (54%) targeted general academic skills applicable to mathematics, while 54 (46%) were mathematics-specific; by the second semester, this shifted to 80 (68%) general academic and 38 (32%) mathematics-specific goals. Ongoing research is needed to explore these patterns. Relatedly, across both semesters, students set relatively complex goals, with about half of students setting goals with a joint focus on developing learning strategies and achieving specific academic outcomes. Exploring factors that influenced these patterns of change over time and the most effective educational supports to enable students to consider strategies and outcomes linked to the curriculum are needed.

Additionally, with larger samples, research is needed to examine differences in the quality of goal statements and GAS rubrics between students with and without disabilities to better inform instructional supports. Exploring the factors that impacted the variability found in goal measurability ($M = 0.96$) and time-boundness ($M = 0.44$), as well as on time-boundness for GAS rubrics ($M = 0.47$), could inform what instructional supports could be intensified during SDLMI delivery. This may be particularly important for students with disabilities or other learning differences who may require additional scaffolding to set a clear and reasonable timeline when writing goal statements and establishing GAS rubrics that consider their current baseline performance. Finally, it is important to note that most students (63% in the Fall and 59% in the Spring) reported achieving their academic goals at or above expected levels, consistent with past research (Raley et al., 2020). We did not find that the goal type, quality, and GAS rubrics were associated with attainment. However, ongoing research with larger samples is needed to further examine how specific factors influence goal attainment outcomes.

Implications for Practice

In this study, we found that the SDLMI can support mathematics teachers in guiding students to set self-directed goals that align with their strengths and identify areas of need related to mathematical learning and engagement. Our findings highlight the range of possible goals that can be set with the SDLMI and the feasibility of teachers aligning the implementation of the SDLMI with their curriculum and students' areas of interest and needs regarding their learning and engagement. In practice, there is a need to expand access to training and ongoing coaching to enable teachers to link the SDLMI to their curriculum, support students as they grow, and enhance their self-determination skills and academic learning outcomes.

Findings also suggest that establishing measurable and time-bound goals and GAS rubrics was the most challenging for students. This has implications for practice and suggests that students may benefit from more targeted support through the SDLMI Educational Supports. Teachers may need additional instruction and materials to teach these specific indicators of goal statements and GAS rubrics quality. Ongoing enhancements to the SDLMI Educational Supports, such as goal setting instruction, to focus more on measurability and time-boundness indicators by providing more examples and opportunities to practice goal statements and GAS rubrics that are measurable and time-bound, can be informed by practice.

Limitations and Future Directions

The findings should be interpreted relative to the following limitations. First, while some research has explored the impacts of the SDLMI on goal attainment (Shogren, Hicks, et al., 2021), the lack of a control group in this study limits the ability to determine the direct impact of the SDLMI on goal quality. Second, the homogeneous sample (n = 81; 68%; White/European American) and the small number of students who self-reported disabilities (n = 4; 3%) limit generalizability. As noted, we did not have access to administrative data, but anecdotally, teachers reported higher rates of students with disabilities who were on IEPs. Thus, ongoing research is needed to determine the generalizability of the findings to students with disabilities and efforts to advance inclusive instruction for students with intellectual and developmental disabilities. However, given the promise of research on the impacts of the SDLMI on students with intellectual and developmental disabilities, the findings suggest more research and practice strategies are needed to promote access to inclusive SDLMI instruction. Of note is that other research has reported similar divergences in self-report and administrative reports of disability and special education eligibility, suggesting the source of data (self-reported vs. administrative data) leads to different conclusions drawn about the impact of interventions (Shogren et al., 2023). Third, the study relied on students' goal statements and GAS rubrics and did not confirm goal attainment levels outside of student reports. Also, fidelity data was not collected, aside from documenting student adherence to providing responses to the Student Questions and creating a GAS rubric. Ongoing research should further explore teacher implementation fidelity as this can influence student outcomes. Fourth, coding procedures were complex, particularly as there was a possibility for each goal to be coded as having multiple focus and outcome areas, limiting our ability to examine the relationship between focus areas. Finally, we observed a lack of variability in the achievability and relevance indicators for the quality of goal statements, suggesting a need to refine the evaluation rubrics to inform research and practice.

Conclusion

This study provides additional evidence of the benefits of using SDLMI to enable self-determined learning in academic contexts. Results suggest that students set high quality goals that focus on building strategies for academic success and advancing outcomes that are important for their academic learning. These findings extend previous research, supporting the idea that teachers can effectively use the SDLMI to facilitate students' self-directed goal setting and attainment processes. The findings also provide guidance for critical areas for ongoing research to identify and intensify supports needed for self-determination instruction in inclusive contexts.

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Table 1

Student Demographics Information

	Overall	
	N	%
Total Sample	118	100.00
Grade		
8th grade	2	1.69
9th grade	3	2.54
10th grade	23	19.49
11th grade	73	61.86
12th grade	8	6.78
Missing	9	7.63
Gender Identity		
Female	64	54.39
Male	47	39.83
Prefer to self-describe	1	0.85
Missing	6	5.08
Hispanic/Latinx		
Yes	4	3.39
No	111	94.07
Missing	3	2.54
Race		
Asian American	15	12.71
White/European American	81	68.64
Two or more races	4	3.39
Other	2	1.69
Missing	14	11.86
Disability Status		
Yes	4	3.39
No	114	96.61
Disability Label		
Autism	1	0.85
Other health disability	3	2.54
N/A (No Disability)	114	96.61

Note. Student demographics information is self-reported data.

Table 2

Frequency of Strategy and Academic Outcome Focus Areas Across Semesters

	Academic Strategy Goals (*n* = 234 total goals; 116 in Fall semester, and 118 in Spring)						Academic Outcome Goals (*n* = 123 total goals; 70 Fall Semester, and 53 Spring)		
Semester	Study Strategies	Time Management Strategies	Note-Taking Strategies	Organizational Strategies	Seeking Support Strategies	Test-Taking Strategies	Improving Academic Performance	Enhancing Understanding of Math	Enhancing Performance on Tests
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Fall	74 (64%)	70 (60%)	6 (5%)	5 (4%)	6 (5%)	4 (3%)	23 (33%)	25 (35%)	33 (47%)
Spring	78 (66%)	75 (64%)	7 (6%)	4 (3%)	2 (2%)	2 (2%)	9 (17%)	12 (23%)	37 (70%)
Total	152(65%)	145 (62%)	13(6%)	9 (4%)	8 (3%)	6 (3%)	32 (26%)	37 (30%)	70 (57%)

Note. Academic strategy and academic outcome focus areas codes are not mutually exclusive, and each goal could be coded as having multiple strategy and outcome areas.

Table 3

Mean and Standard Deviation of Goal Statements Quality Indicators Across Semesters

	Specificity		Measurability		Achievability		Relevancy				Time-Boundness**	
							Explicit Alignment with SDLMI*		General Alignment with SDLMI*			
Semester	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Fall	1.96	0.20	0.91	0.89	2.00	0.00	2.00	0.00	2.00	0.00	0.45	0.65
Spring	1.96	0.20	1.01	0.88	2.00	0.00	2.00	0.00	2.00	0.00	0.42	0.50
Overall	1.96	0.20	0.96	0.88	2.00	0.00	2.00	0.00	2.00	0.00	0.44	0.58

Note. SD = Standard Deviation. * These indicators are mutually exclusive, each student goal was only coded for one of these indicators within the relevancy domain. ** While time-boundness had two, mutually exclusive indicators, they were combined for reporting because of the low use of one of the indicators.

Table 4

Mean and Standard Deviation of Goal Attainment Scaling Rubrics Quality Indicators Across Semesters

	Specificity		Measurability								Achievability		Relevancy		Time-Boundness**	
			Agreement		Unidimensionality		Equidistance									
							Numeric*		Non-numeric*							
Semester	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Fall	1.91	0.37	1.97	0.21	1.19	0.91	1.15	0.74	1.37	0.81	1.98	0.18	1.98	0.18	0.47	0.52
Spring	1.91	0.37	1.93	0.34	1.22	0.89	1.17	0.83	1.48	0.82	1.94	0.33	1.95	0.32	0.46	0.50
Overall	1.91	0.37	1.95	0.28	1.21	0.90	1.16	0.73	1.43	0.81	1.96	0.27	1.97	0.26	0.47	0.51

Note. SD = Standard Deviation. * These indicators are mutually exclusive, each student GAS rubric was only coded for one of these indicators. ** While time-boundness had two, mutually exclusive indicators, they were combined for reporting because of the low use of one of the indicators.

Table 5

Multilevel Analysis of Academic Goal Attainment Outcomes and Associated Factors

	Model 1		Model 2		Model 3		Model 4		Model 5	
Predictors	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*	*Estimates*	*p*
(Intercept)	-0.25(0.05)	**<0.001**	-0.20(0.07)	**<0.008**	-0.31(0.07)	**<0.001**	0.10(0.29)	0.745	-0.30(0.31)	0.350
Time			-0.10(0.10)	0.315						
Type of Academic Learning Goals					0.15(0.11)	0.190				
Overall Goal Statements Quality							-0.24(0.19)	0.225		
Overall GAS Rubrics Quality									0.03(0.20)	0.890
Random Effects										
level-1 error variance (σ2)	0.60		0.60		0.60		0.60		0.60	
level-2 error variance (τ00)	0.07		0.07		0.07		0.07		0.07	
ICC	0.11		0.11		0.10		0.10		0.11	
Model fit										
AIC	580.84		581.82		581.10		581.35		582.82	
BIC	591.23		595.67		594.95		595.20		596.67	
logLik	-287.42		-286.91		-286.55		-286.67		-287.41	
Deviance	574.84		573.82		573.10		573.35		574.82	
Chisq			1.0185		1.7385		1.4908		0.0202	
Df			1		1		1		1	
Pr(>Chisq)			0.3129		0.1873		0.2221		0.887	

Note. Model 1 is the empty model; Model 2 includes time as a predictor (Fall semester coded as 0 and Spring semester coded as 1); Model 3 includes the type of academic learning goals as a predictor (goals aligned with general academic skills codded as 0, and goals aligned with the math subject area coded as 1); Model 4 includes overall goal statements quality as a predictor, and Model 5 includes overall GAS rubrics quality as a predictor.