

Full Paper: Goal-Setting Reflections for First-Year Students

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Goal-Setting Journals for First-Year Students

1. Introduction

The transition from high school to college can be challenging for engineering students. During that first semester, it is often difficult to prioritize personal time and space for thinking about and reflecting on new academic experiences. Yet this is a critical phase for students to build a foundation from their first-year courses and capitalize on opportunities to discover and practice how to succeed in engineering.

Reflection in engineering education has been underutilized and is often neglected. However, recent growth in reflective activities for engineering courses [1] has led to improved understanding of pedagogical approaches utilized in reflective practices [2]. Reflection encourages students to make meaning of their learning experiences and to consider future actions that are grounded in those experiences. Like other skills, one must practice reflection to become proficient. To that end, introducing reflective activities in first-year courses can jumpstart the process while normalizing its practice in engineering education. Heo et al. [3] showed there are strong links between student reflection behaviors, achievement goals, and realized learning outcomes of undergraduate engineering students. Reflection activities can be categorized into a collection, such as the one established by the Consortium to Promote Reflection in Engineering Education (CPREE) [4]. One of its core categories is for personal inventory, which includes reflection activities that focus on student goals, values, and behaviors.

This paper describes reflective journal assignments in Introduction to Civil Engineering at the University of South Carolina. These assignments provide students with opportunities to select and evaluate their own goals for the course. The discussion focuses on the goals that students selected, rather than the self-evaluation of achievements associated with their goals.

2. Methods

Introduction to Civil Engineering is required for the major, but it is not a pre-requisite for other courses. It is offered each fall semester and enrollments are 100 ± 10 students. In a typical semester, about 75% are first-semester college students with a wide range of high school experiences. The remaining 25% are comprised of second-year students who opted not to take the course in their first year, students who switched into the major, and transfer students from other institutions. One reason for implementing a journal was to personalize the course for this 25%, including older students who often feel disinterested or out of place in a 100-level course.

Reflective journaling was constructed on three core principles. Students should (1) consider their own expectations for personal learning in courses; (2) practice establishing and monitoring academic, personal, and/or professional goals; and (3) engage in honest self-reflection that is shared with their instructor. The journal tool in Blackboard provides a private communication space between student and instructor. Having appropriate and meaningful prompts is critical for guiding students on what to write about. Prompts are designed to accommodate students at various points in their academic progression, which includes the aforementioned 25% of the course population.

Goal-setting journals were initiated in fall 2019 and have been required for three consecutive course offerings. The journal has evolved into a sequence of four specific prompts shown in Table 1. Prompts are designated using JAX-WY nomenclature, where JA = journal assignment, X = assignment number (1-4), W = week, and Y = week the assignment is due (1-16). The first prompt, JA1-W2, focuses on what students know that is relevant to the course. It is designed to learn about each person's prior knowledge of and/or experience with engineering. The second prompt, JA2-W3, asks students to set three goals using the SMART model: **Specific** – provide a clear description of what needs to be achieved; **Measurable** – include a metric with a target that indicates success; **Achievable** – set a challenging target, but keep it realistic; **Relevant** – keep goal consistent with higher-level goals; and **Time-bound** – set a date when goal needs to be achieved. The third prompt, JA3-W9, is a mid-semester progress check on what actions have been taken to achieve their goals. At the end of the semester, students complete a self-evaluation of accomplishments associated with their personal goals (see JA4-W15 in Table 1).

Students are required to submit four journal entries for 5% of their course grade. Responses are assessed for completeness with answering all parts of the prompt. We emphasize that there is no right or wrong answer; rather, responses should be unique to the student. The course instructor, not a teaching assistant, reads and grades each submission within one week after the deadline. Brief comments are included to acknowledge that their journal entries have been read. The tone is positive and encouraging, and when appropriate, includes personal reactions connected to the instructor's own experiences and information about departmental or campus resources related to their goals. For students with incomplete submissions, written feedback provides a clear description of what was missing.

3. Results and Discussion

A key question was whether students would engage in and commit to the process of reflective journaling for a 100-level engineering course. Figures 1 and 2 summarize the assignment response rate from fall 2021. A total of 95 students completed the course. Journal submissions from students who withdrew during the semester are not included. As shown in Figure 1, the completion rate decreased chronologically for each assignment, starting with a 94.7% rate for the first one and ending with a 70.5% rate for the last one. The high numbers of students not submitting the third (13.7%, or 13 students) and fourth (20.0%, or 19 students) journal entries were somewhat concerning. Most students who did not submit these two journal entries were disengaged during the second half of the course. These students had multiple absences and were not submitting other assignments. Figure 2 highlights that 8 of the 10 students who did not complete three or all four of the four required journal assignments were found to have left the institution, changed majors, or were on academic probation at the end of spring 2022.

Figure 1 shows 85.3% (81 of 95 students) submitted a complete second assignment (JA2-W3) on setting three personal goals, resulting in a total of 243 goals. Several themes emerged from a qualitative analysis of these goals. Students with incomplete assignments for JA2-W3 were not included in the analysis. The three most prevalent categorizations are (1) exploration of the field/major/disciplines; (2) interaction with others; and (3) development of hard and soft skills and abilities. These goals align well with pedagogical strategies and student learning objectives that were introduced during the first two weeks of the course.

Table 1. Reflective Journal Assignment Prompts

Assignment Deadline	Complete Prompt
<p>JA1-W2 (journal assignment 1 due at start of week 2)</p>	<ul style="list-style-type: none"> • First, brainstorm what you know about the main topics for this course. You do not have to write them down here, but spend some time thinking about them. Each student is entering this course with a different background - some students have more knowledge about civil engineering than others. Your response should be unique to you and reflect your personal background and experiences. • Now, answer the following questions. What abilities or skills have you learned or practiced in other classes (high school or college) that might relate to, or be important for, this class? In those classes, what activities were most helpful in learning or practicing those abilities or skills? Describe at least three abilities or skills and the activities that most helped with learning them. • Finally, discuss how you have applied each one of those abilities or skills in other settings, like clubs/organizations, sports, hobbies, jobs, research, or as part of life in general.
<p>JA2-W3</p>	<ul style="list-style-type: none"> • Go back and read what you wrote in Reflection 1. Consider what you know now about this course and the abilities and skills needed to be successful as an engineering student. Now think about personal goals for this course. Each student has their own background and experience entering this course. Your goals should be unique to you. • In this reflection, write down three personal goals for this course. Use the SMART approach described in class to help with setting goals that are measurable and achievable. Your goals should specifically relate to what you want to learn and/or what abilities or skills you want to gain, not the grade you want to get. While setting goals for course grades is important, do not include them here. • Explain why you set each one of these goals. In other words, why are they important to you? • Close with a discussion of how you propose to achieve each one of your goals. In other words, what is your plan?
<p>JA3-W9</p>	<ul style="list-style-type: none"> • Look back on the three personal goals you set at the beginning of the semester in Reflection 2. NOTE: If you did not submit Reflection 2, you must post a separate journal entry for it before completing Reflection 3. It will not be accepted for credit, but it is required in order to earn credit for Reflection 3. • Answer the following questions about each goal. How are you progressing towards each one of your three goals? What have you done to try to achieve them? Are these approaches working? Why or why not? What might you change about your methods for achieving your goals, and why? Do you need to alter them or establish new goals? If so, what would they be and why?
<p>JA4-W15</p>	<ul style="list-style-type: none"> • Now that the semester is almost over, reflect on how you have or have not achieved each one of your three personal goals for this course and how that will impact you in the near future (like next semester or next year, for example). This reflection should not be a repeat of what was written in Reflection 3. Rather, it should build on what was written there about making progress towards each goal. • Then, answer the following three questions. What would you say was your biggest achievement in this course, and why? What would you say was your biggest challenge in this course, and why? Lastly, what is something significant you've learned about yourself in this course, and why is that important to you?

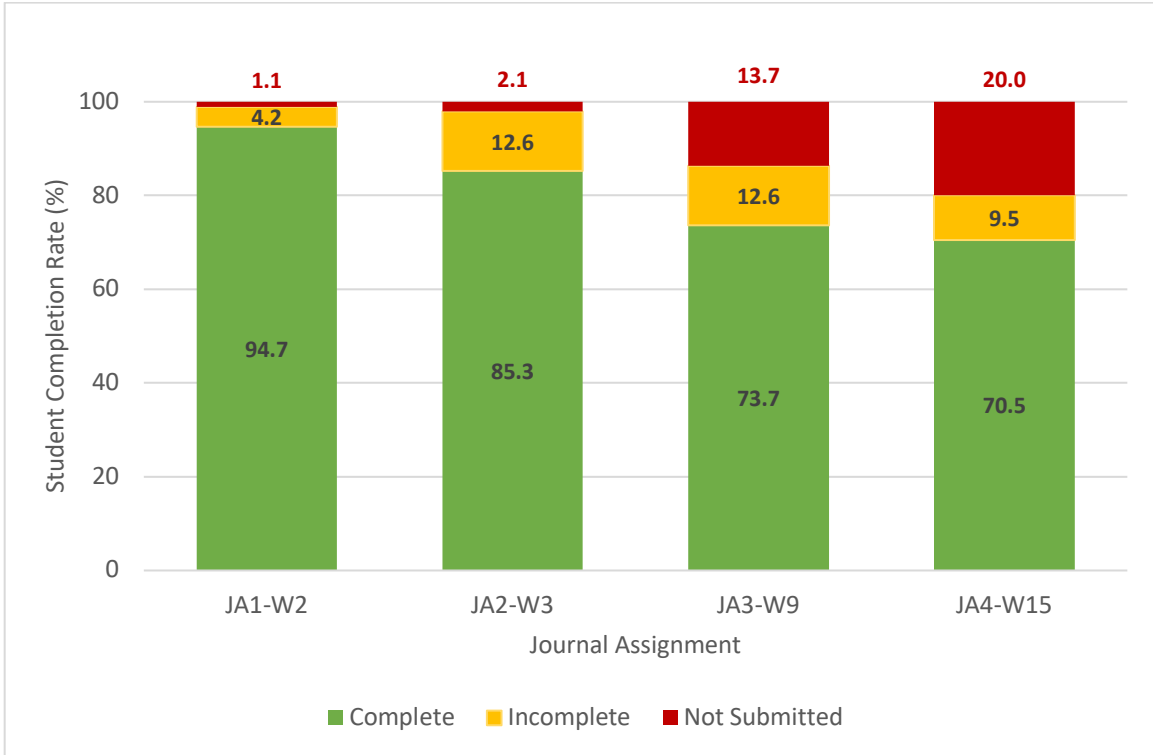


Figure 1. Student completion rate (n=95) for journal assignments.

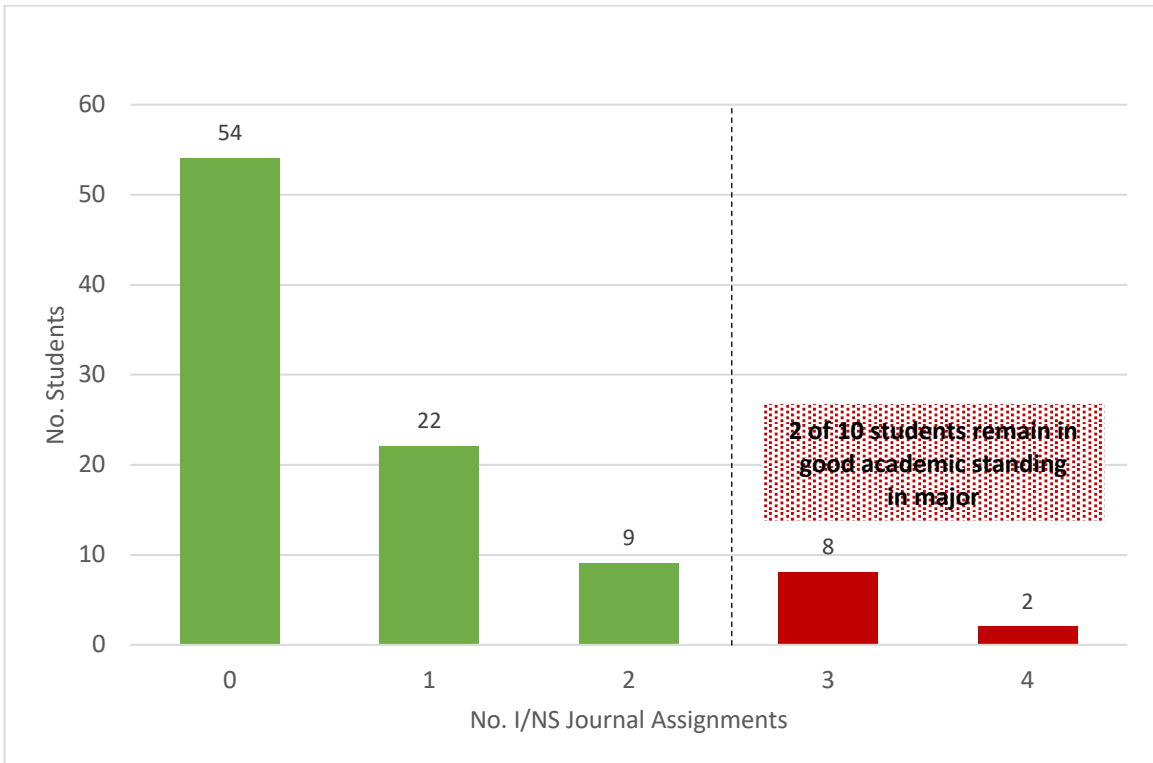


Figure 2. Students (n=95) with incomplete and not submitted (I/NS) journal assignments.

A total of 69 of 243 personal goals, representing 49 individual students, were coded as exploration of the field/major/disciplines. This means 60% (49 of 81 students) that completed the second assignment had at least one goal associated with acquiring knowledge about engineering and, more specifically, civil engineering. Figure 3 illustrates the distribution of these 69 goals into three unique groups. Deciding on and committing to a major is one of the most important milestones for college students. Of the 14 students who identified this decision as a personal goal, 13 of them concluded that civil engineering is the right fit (according to their self-evaluations in JA4-W15). These findings were confirmed with an academic check of student status in the major at the end of spring 2022.

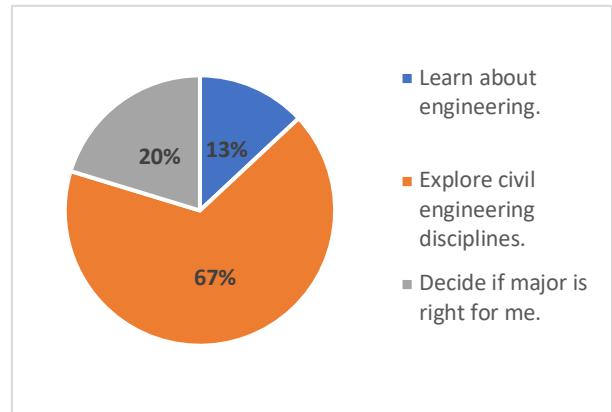


Figure 3. Distribution of personal goals (n=69) on exploring engineering.

Goals that involved interacting with others was the second common theme. These goals (60 of 243) were grouped into four subcategories: improving communication skills; improving teamwork skills; meeting new people and making friends; and establishing relationships with professors. Almost 75% of them were concentrated on meeting new people and improving teamwork. One observation about meeting new people is that students were more likely to set measurable goals, such as “make five friends before the end of the semester.” Goals associated with improving teamwork skills were diverse but perhaps more difficult to appraise. Examples include learning from conversations with teammates, being more comfortable working with people from different backgrounds, improving abilities to resolve problems in teams, and becoming a better leader. In contrast with meeting new people, students often struggled to define these goals in such a way to make them measurable.

Although communication encompasses hard and soft skills, it was included as part of interacting with others. While some of the communication-related goals were generalized or simplified, most stated or implied social or professional interaction with another person. A few examples are asking good questions, being able to voice what I am thinking, being more comfortable presenting to an audience, and learning how to present a proposal and make recommendations.

Most (85) of the remaining (114) goals were grouped into the development of hard and soft skills and abilities. Students focused more on improving soft skills and abilities than acquisition of technical knowledge. This appears to be a reflection of course content and indicates that students understood the nature and construct of the course prior to selecting their goals. Knowledge and skills sometimes overlap and coding them required interpretation of some written responses. Problem-solving is one of the topics where this occurred. One student, for example, established a goal related to the application of engineering design principles to solving problems. Other students had goals with understanding the role of math in engineering problems. These were coded as knowledge acquisition but can also be considered hard skills (i.e., *design* and *math* skills). Most goals that involved problem-solving were coded as soft skills. Regardless of

coding protocols, the emphasis on personal development of skills was prominent.

The soft skills and abilities that students identified were incredibly broad and diverse. In addition to problem-solving skills, some of the more populated subgroups include thinking like an engineer, work-time management, and improving study skills and habits. But there were lots of subgroups that three or fewer students identified. Some of the more interesting ones include developing a level of comfort with being uncomfortable; performing under pressure; willingness to make mistakes; attention to detail and tightening up on small mistakes; distinguishing what is more important from what is less so; being more artistic, creative, or innovative; and being more personable or more reliable.

4. Conclusions and Future Recommendations

This paper shows that civil engineering students in a first-year course are able and willing to engage in reflective journaling on personal goals. Students identified three goals after the second week of classes, and three emergent themes for student goals are present. The themes are to discover what engineering is, interact with and learn from others in the course, and develop one or more hard or soft skills. The prominence of these themes is evidence that course expectations, established in the first two weeks, influenced how and what goals were selected. Having a collaborative, problem-based learning environment in the course seemed to have a noticeable imprint on student goals.

A decline in journal submission rate was observed over the course of the semester. Some students became disengaged with the course, which resulted in a higher rate of missed journal assignments at mid-semester and end-of-semester. Contributing factors might include a lack of incentive because the journal is just 5% of the course grade; a low rate of return on journaling (time spent vs. points earned), particularly for students who find writing difficult and time-consuming; and increased demand for their time and effort in other courses, especially required math and science courses. These factors will be explored in future studies.

5. References

- [1] Sepp, L.A., & Orand, M., & Turns, J.A., & Thomas, L.D., & Sattler, B., & Atman, C.J. (2015), *On an Upward Trend: Reflection in Engineering Education*. Paper presented at 2015 ASEE Annual Conference & Exposition, Seattle, Washington. 10.18260/p.24533
- [2] Mina, M., & Cowan, J., & Heywood, J. (2015), Case for reflection in engineering education- and an alternative, *2015 IEEE Frontiers in Education Conference (FIE)*, pp. 1-6, doi: 10.1109/FIE.2015.7344252.
- [3] Heo, D., & Anwar, S., & Menekse, M. (2018), The relationship between engineering students' achievement goals, reflection behaviors, and learning outcomes. *International Journal of Engineering Education*, 34(5), 1634-1643.
- [4] Consortium to Promote Reflection in Engineering Education, 2014-2015 Reflection Field Guide, <https://www.bellevuecollege.edu/engineering/cpree/>, accessed March 15, 2022.