

Becoming an Engineering Learner

Educator: Rainer Heller, Faculty & Program Coordinator – Physics, astronomy, computer science, and engineering

Context: Out-of-class; Orientation to Engineering

Keywords: study skills, first-year experience, goal setting

Student Activity Time: 1 hour

In an orientation to engineering course, the first assignment prompts students to explore their attitudes, and study habits to develop a strategy for becoming a successful engineering learner.

Introducing the Reflection Activity

New students, especially those intending to major in engineering, often need to establish effective habits to become an outstanding learner. The first homework assignment in the Orientation to Engineering course included 5 activities to assist students in achieving the learning outcomes of the course. The purpose of this activity was to introduce students to the course outcomes and assist them in forming goals toward becoming a successful engineering student.

During the first class session, the educator introduced the course outcomes to students and discussed the concept of goal setting as an engineering student. After the assignment is discussed in class, the educator provides a worksheet that is designed to prompt students to reflect on some habit, skill or characteristic that is implicitly identified as important to being a successful engineering learner. For the five activities within the assignment, the students are asked to reflect on their responses.

The first activity focused on students' attitudes about school and their habits that may support or counter their purpose in taking the course. The second activity focused students' attention to their time schedule and introduced the 60-hour rule among other tips. The 60-hour rule suggests that people cannot perform well with more than 60-hours per week spent on commuting, school, and working. For this portion of the assignment, students were prompted to reflect on their commitment levels and identify strategies to overcome these potential hurdles. Next, students rated their skills and commitment to becoming an engineer and consider both their strengths and weaknesses in this domain. The fourth activity prompted students to consider and categorize how skills and characteristics in the prior exercise relate to their skills, attitude, and approach to studies. To conclude the assignment, students develop a plan to overcome the factors that may interfere with their ability to perform at their best. Students were asked to list the factors that interfere with achieving their academic potential, label them as internal or external, and list steps that they can take to mediate those factors. After developing a full list of inhibiting factors, students selected three to address during the academic term.

The educator found that many students take this activity seriously and voice to that they had never done a personal examination like it before. Student outcomes were primarily drawn from the last activity in the assignment, especially as they considered strategies to overcome their challenges. Additionally, students become more open to self-reflection and a greater understanding of the relationship between in and out of class responsibilities and habits.

Recreating the Reflection Activity

	Description
1	Explain the course outcomes to the students and the purpose of the assignment.
2	Allow students until the next class period to complete the assignment form.
3	Discuss success strategies and campus resources in the subsequent class session.

In the words of the Educator: Tips and Inspiration

Keep the activity private. Before I give students the activity I emphasize that this is a private activity, and that they don't have to share everything with me. I only ask that they print out the assignment twice, one for the grade, and one for themselves. They can even choose to write more information on the version that they keep for themselves than the version they turn in. The main point of the activity is for them to reflect and take some action to overcome the challenges that they will face for the term, so I only grade them for completion. It can be very humbling for me as a teacher, because some students share a lot of personal information.

Help students view their skills and attitudes as adaptable. In the fourth activity, they do not have to write anything if they don't want to, but the goal is to get them to start thinking about a plan to gain skills or adjust their attitude. It's about acknowledging that you might lack certain tools, but they can seek out the tools that they need to develop a skill. As a teacher, I want them to see that if they have a problem with time management that correcting it can be learned. In class I talk about my own experience with time management. I used to keep my calendar in my head, but when too many things are going on I would drop the ball. As a result, I started using Outlook as a tool to help me manage my time. There are several tools that people can use to develop a skill, and I give them examples of that. Changing attitudes is hard, and requires more effort, because you really have to question your motivation in the first place. Challenges with time management can be about an attitude, and for some people having the tools to overcome a challenge does not always help because they have not changed their attitude.

What was the inspiration for the reflection activity? I took a workshop by a dean emeritus of engineering, Raymond Landis a few years ago. He noticed in his

engineering teaching career that there is a high rate of attrition in engineering and he felt a lot of those students could have been saved. If a student quits engineering because their heart is in art, that's not a lost cause, but if you fail in engineering because of poor financial skills then that's something that could have been remedied. Some students have attitude issues--they can't stand not being at the top of the class. They stop coming to class and eventually fail out. Those are all things that could be addressed by each student working on themselves. He wrote the textbook that I use in the class as well. I just feel it works

One of my goals is to help students break out of a passive role and become actively involved in their education. In the classroom, I'm really focused on students learning by doing, instead of me just lecturing about how to do something. This activity is really about the course learning outcomes of developing an academic plan, evaluating and improving study skills, developing goals, and applying the engineering design process.