

## **Full Paper: Incorporating Academic Coaching in First-Year Engineering Program to Support Student Success and Persistence**

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## **Abstract**

The First-Year Engineering Program (FEP) was designed to deliver foundational knowledge of engineering studies, to provide proactive support for all new freshmen entering the College of Engineering and to help the College's efforts to increase retention and graduation rates. While the addition of FEP in College of Engineering in 2007 boosted retention rates significantly, the rate has been fluctuating around 71-72% in recent years. As a part of continual development, FEP added academic coaching to its services in 2018 to better equip our students for academic struggles outside of learning course content. This paper focuses on the impacts of the academic coaching components that were offered as graded activities in the first-year engineering courses. We also investigated any effects of a pilot 8-week course offered and taught by academic coaches in spring 2022 for students placed on probation after their first semester.

Our results show more than half of the students appreciated the use of class time for academic coaching activities. Some subjects, such as time management and test preparation, were more popular than the others. More than 60% of the students agreed that they learned a new tool to help their academic success in future. The results of the academic intervention course showed a positive impact on the probation students; however, the results were difficult to analyze since several students benefited from the university's grade exclusion policy and got a GPA boost.

## **Introduction**

The First-Year Engineering Program (FEP) was designed as a common first year program for all first-year engineering and computer science students. The mission of the program is to deliver foundational knowledge of engineering studies, to provide proactive support for all new freshmen entering the College of Engineering, and to help the College's efforts to increase retention and graduation rates. Since FEP was established in 2007, the second-year retention rates for College of Engineering increased from 61% to around 70%. For the last several years, the rate has been fluctuating around 71-72%. FEP continually explores new ways to support freshmen engineering students and understand the changing needs of current students in the hopes of increasing retention rates and fostering student academic and professional success. However, many factors play into the academic success of individual students. Numerous studies have identified factors that influence whether a student will persist in engineering including classroom climate, academic success (i.e., grades and conceptual knowledge), self-confidence/self-efficacy, academic preparedness, career interests and race and gender [1]. Time management and study skills are key areas with which most new freshmen engineering students struggle. Effective time management strategies increase academic performance [2], as well as productive study methods [3].

Academic coaches provide individualized academic support to students in the College of Engineering to improve student persistence and degree completion. FEP added academic

coaching to its services in 2018 to better equip engineering students for academic struggles outside of learning course content. The academic coaching team started as one coach and continually grew; currently, there are two full-time academic coaches that are supported by two part-time academic coach graduate assistants. The coaches schedule one-on-one meetings with students to co-create a success plan that considers life experiences, academic goals, and long-term professional aspirations. The Academic Coaching team also offers in-class presentations, group coaching, and monthly skill-based success workshops for engineering students. Additionally, academic coaches also connect students to appropriate services on campus, such as mental health services, tutoring, career guidance, learning accommodations, and more.

This paper focuses on the impacts of the addition of academic coaching component to FEP. The objective is to investigate the impact of implementation of academic coaching activities in the first-year engineering curriculum on the engineering community. We will also examine the impact of an 8-week course offered in spring 2022 for students placed on probation after their first semester. This course was a combination of self-awareness and college learning topics and was offered free of charge for students who made a passing grade in the course.

## **Research Approach**

The FEP includes a two-semester course sequence, Introduction to Engineering I and II (GNEG 1111 and GNEG 1121), where students are exposed to technical content two times a week in the classroom and student success concepts once a week in a larger drill session. Academic coaches presented four drill sessions in the fall semester and one session in the spring semester.

Presentation topics were:

1. Fall Semester Drill Week 1: Time Management - In this drill, students assess their time management, develop a fixed commitment schedule, and learn how effective time management and prioritization contributes to their academic success
2. Fall Semester Drill Week 4: Test Prep: Starting Successful Study System - In this drill, students develop a plan for approaching exams by creating an individual study system. Students assess their inputs (time, content, resources, person: mental, physical, emotional) and make adjustments to achieve desired outputs in their first set of exams.
3. Fall Semester Drill Week 8: Post-Test Analysis: System Check - Students reflect on their first set of exams and evaluate their study systems to make strategic adjustments. Students also learn how to develop habits, foster self-awareness, and conclude by writing a detailed goal commitment with tangible steps and outcomes.
4. Fall Semester Drill Week 14: Finals Prep - In this drill, students assess their courses, learn to prioritize, and develop a plan for approaching their final exams using a prioritization equation. Students create an individual study plan designed to obtain desired outcomes and learn how to approach cumulative exams.
5. Spring Semester Drill Week 1: Restarting the Semester - Students gain fresh perspective for spring semester planning using a metaphor tool to creatively assess how college is a process. Students evaluate their goals, illustrate a plan, and work in groups to create a visual metaphor reflecting their plan for approaching the semester.

In addition to the weekly course requirements, first-year students are also required to have one group academic coaching session at the beginning of their first semester. They also participate in a mandatory weekly peer mentor meeting with an upperclassman. Outside of the mandatory sessions, students are encouraged to make individual appointments with Academic Coaches as needed throughout the duration of their academic career.

## Results and Discussion

At the end of 2023 spring semester, we offered an academic coaching exit survey to students as a bonus activity in class. 395 students took the survey; we summarized the results below.

### *Feedback on Mandatory Group Coaching:*

The objectives of the mandatory group sessions were to introduce students to the concept of academic coaching, and begin to establish peer learning groups within the college of engineering, create a sense of belonging in the Program, College and University. During the summer orientation in 2022, all students were informed about the mandatory group coaching and had the opportunity to sign up for a 30-minute session. Sessions were available beginning a week before the start of the fall semester and continued two weeks into the semester. Out of the 395 students who took the survey, 382 (97%) responded that they had attended the group coaching in the previous fall. The results of the survey are presented in Figure 1.



Figure 1: Responses from 382 students to the three questions related to group coaching session.

Figure 1 shows that 54% of the students rate the group coaching activity satisfactory and about half the students met new people during group coaching. While these numbers are lower than desired, it is encouraging to see that about 82% of the students think that the group coaching session contributed to their preparedness for the semester. We also believe that a timelier survey, perhaps given at the end of the first semester instead of the spring semester, would be an improvement for the next academic year.

### *Feedback on Academic Coaching Related Drill Sessions:*

Academic coaches led the GNEG drills four times during fall semester and once at the beginning of the spring semester. The timings of these sessions were picked strategically to align with most common exam schedules. Table 1 summarizes the students' perspectives on the individual drills.

Finals prep was identified as the most effective student success drill topic, and most students found each of the drills somewhat or very effective.

Table 1: Student responses to the question “How would you rate each academic coaching activity that was covered as a requirement for GNEG classes/drills?”.

	Very effective	Somewhat effective	Neither effective nor ineffective	Somewhat ineffective	Very ineffective	Did not attend
Drill Week 1: Time Management	22%	46%	19%	7%	6%	1%
Drill Week 4: Test Prep	24%	42%	22%	8%	4%	1%
Drill Week 8: Post-Test Analysis	17%	39%	26%	10%	6%	2%
Drill Week 14: Finals Prep	23%	47%	17%	6%	5%	1%
Spring Drill Week 1: Restarting the Semester	23%	38%	21%	9%	7%	2%

We also asked the students to select their favorite/most helpful academic coaching activity. The favorite was the time management drill (35%), followed by test preparation drill (18%), finals preparation drill (15%), restarting the semester drill and mandatory group coaching (13% each), and post-test analysis drill (6%). About half the students agree or strongly agree that the academic coaching in drills was a good use of their time whereas 63% agree or strongly agree that they learned a new tool that benefits their academic success (Figure 2).

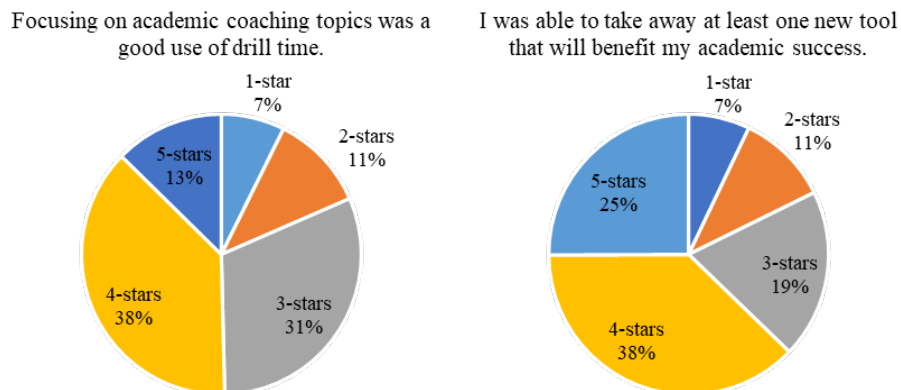


Figure 2: Rankings from students on academic coaching related drills. Students were told to rate on a scale of 1 to 5 where 1 is strongly disagree and 5 is strongly agree.

This information helps us plan the amount of drill time we allot to academic coaching activities during the upcoming academic year. Drill time is shared between major selection, academic coaching, and professional development activities.

Apart from the mandatory coaching activities in GNEG courses, we asked the students if they scheduled (optional) individual coaching sessions during the academic year. 65% did not attend any individual sessions, 18% attended one, 14% attended 2 to 5, and 2% attended more than 5 sessions. The most common reason was “I didn’t need it”, followed by “I was too overwhelmed

to add something else”. While most of these students did not schedule an individual appointment this semester, we find it valuable for students to understand available resources.

At the end of the survey, students were asked to complete self-reflection questions:

- 1) What specifically have you done differently as a direct result of the academic coaching skills taught in the drill classes?
- 2) What specifically have you learned about yourself as a result of the academic coaching drill sessions?

The responses to these questions were then categorized based on whether the students’ response showed a growth in self-efficacy. The comments that showed the students changed their habits to attain a specific goal were labeled as showing self-efficacy as demonstrated in the following:

- “I have started taking more time to study. I think that my study habits changed as a result as well. Spending more time studying made my studying more efficient.”
- “I have look at how I do things and realize if they are beneficial to me, if they are not, I make a change”

145 (37%) of the students stated that they used the time management drill activity to create a calendar electronically, buy a planer, develop a schedule, and continue this habit throughout the year. The test prep activity was the second most utilized activity, with 86 (22%) of the students stating that they created a study plan. The two main objectives of this activity were 5 or 7 day study plan, and active studying vs passive studying. Comments from the students included:

- “I’ve learned that I get the most out of my studying sessions when I keep them diverse, as in not just focusing on one subject. It prevents me from losing interest and zoning out.”
- “I study a lot more in advanced because of the 5 and 7 day study plans. It showed me it is better to spread it out beforehand just so I don't feel crammed.”

54 (14%) of the students showed self-efficacy/self-awareness. Unfortunately, 72 (18%) of the students stated that they did not find academic coaching beneficial in any way. Similarly, for question 2, the top two categories where students learned about themselves were time management (145 students or 37%) and test prep (102 students or 26%), with 102 (26%) of the students showing self-efficacy. We asked students to name other topics they would have found helpful to cover in drill. Even though there were multiple drills associated with time management and test preparation, 23% of the students requested more drills associated with these skills.

## **Probation Intervention**

Another way the coaches helped first-year engineering students was through their Probation Intervention course offered in Spring 2022. Students who have a cumulative GPA  $< 2.0$  are placed on Academic Probation. Students can remain on Probation if their semester GPA is  $\geq 1.8$  until they get their cumulative GPA over 2.0. Students on Probation who earn less than a GPA  $< 1.8$  go on Academic Suspension for one semester. All First-year engineering students who found themselves on Academic Probation at the end of the Fall 2021 semesters were encouraged to take a one credit hour Special Topics course for Probation Intervention. Students met with

coaches each week and completed assignments that helped them learn study skills for their other courses. Of the 47 students who took the course, two were above the probation line; 13 more were able to move themselves off probation by using Grade Exclusion (a policy that allows students to erase up to 9 hours or grades and corresponding credits over their time at the university). Table 2 summarizes students' Academic Standing after the second semester based on their standing after their first semester accounting for Grade Exclusion. Although not all students recovered, 18 students were able to return to Good Academic Standing and 15 more avoided Academic Suspension. Although not all students were saved, the Academic Coaches gave many students the tools they needed to continue.

The comparison to the 2020 cohort is not perfect because Grade Exclusion was not looked at for these students just their actual GPA for Fall and Spring semesters. There was a temporary policy in place in Fall 2020 that would have allowed for retroactive withdrawal for any courses the student did not pass. Based on these numbers though, roughly half (50/99) of the 2020 cohort would have been suspended instead of continuing to their 2<sup>nd</sup> Fall semester while only a quarter (12/47) of students in the 2021 cohort with intervention would have been suspended.

Table 2. Academic Standing for students who participated in the Academic Probation Intervention course compared with those one year earlier who were on probation.

Probation Intervention Students	Status after First Year			Grand Total
	Good Standing	Academic Probation	Academic Suspension	
Status After First Semester				
Probation with Fall Grade Exclusion	10	10	12	31
Probation w/o Grade Exclusion, Good Standing with Grade Exclusion	8	5		13
Good Standing w/o Fall Grade Exclusion	2			2
Grand Total	20	15	12	47
Fall 2020 Cohort on Probation (intervention course not available)	30	19	50	99

## Conclusions, Future Work, and Acknowledgements

One improvement we plan for next year is to divide up the academic coaching survey and ask students for timely feedback, ideally within one to two weeks of the activity. We also would like to investigate if participating in academic coaching activities increases second year retention. Since second year retention rates have been hovering around 70%-72% at College of Engineering, there is an increased effort to focus on student success services such as academic coaching and re-organizing advising process. A future, consistent increase in second year retention rates could be attributed to the addition of the academic success strategies to the first-year curriculum. We would also like to examine if participation in academic coaching increases students' study skills and can be reflected as an increase in GPA.

We would like to thank our academic coaches for the helpful conversations during the preparation of this paper and for their efforts to improve student success.

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