

Supporting Academically-Struggling Students in an Engineering First Year Program: Course Evolution

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Supporting Academically-Struggling Students in an Engineering First Year Program: Course Evolution

The First Year Engineering program at North Carolina State University (NCSU) has many goals, one of the most important being supporting students through their personal and academic transition from high school to a college-level engineering program. This goal of supporting students during this significant transition period aims to positively impact student outcomes including retention in the College of Engineering and at the University.

Prior to 2009 students who earned less than a 2.0 GPA (Academic Warning) in their first semester were required to meet with their academic advisor within the first four weeks of the spring semester, but were not offered any other specific support. In an effort to enhance support for student transitions and retention for the at-risk population of academically struggling first-year students, the College of Engineering in conjunction with University offices such as Enrollment Management and Retention Services, developed a second-semester course for first-year students who are on Academic Warning. This course was piloted in the spring of 2009.

This academic support course, E 122: Engineering Academic Success, began as a graded, semester long, one-credit-hour course that met once a week and included assignments related to journaling, self-awareness, individual conferences, and skills-building exercises. Learning outcomes included students being able to identify strategies to improve their academic standing; describing areas of improvement needed for their particular academic/transitional challenges; identifying success strategies to utilize in all academic courses, and being able to identify campus resources that may aid in their personal and academic success. The course was exclusively facilitated by Engineering Academic Affairs staff, Enrollment Management staff, and Academic Support Programs for Student Athletes (ASPSA) staff. The course was required for some students and optional for others.

Over the past eight years the course has evolved with observational, anecdotal, and quantitative evidence as instructors have annually evaluated what has been effective for student enrollment and participation, and for academic and retention-based outcomes. Some changes over the years have had positive outcomes, others have had negative outcomes, and still others have seen no changes. The current form of the course is considered to include the best practices to date, which have evolved over the eight-year life of the course. The current version of E 122 can be described as a graded, eight-week, one-credit-hour course that meets twice a week, and includes assignments related to skills-reflection and skills-building exercises. The course is facilitated by College of Engineering Academic Affairs staff and is supported by guest lecturers from on-campus content experts in the areas of stress management, counseling resources, academic and tutoring resources, etc. The course is required for two populations of students; those on Academic Warning after their first semester and those who failed to successfully complete the required introductory engineering course taught in the fall semester.

Introduction

The College of Engineering is the largest college within NC State University with over 10,000 undergraduate and graduate students. All undergraduate students begin in the Engineering First Year (EFY) Program; one of the most important goals in the EFY Program is supporting students through their personal and academic transition from high school to a college-level engineering program. This goal of supporting students during this significant transition period aims to positively impact student outcomes including retention in the College of Engineering and at the University.

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Course Structure

When the course, Engineering Academic Success, was introduced it began as a graded, one-credit-hour course that would meet once a week for 50 minutes, for the full 15 week semester. In addition to the weekly class meeting, additional responsibilities included a minimal number of assignments designed to take less than thirty minutes to complete and two individual meetings with course instructors outside of the assigned class time. This structural model continued until the spring of 2012.

In the spring of 2013 the course structure was changed. The course continued to be graded, but became an eight week course that met for 50 minutes, twice a week during the first half of the semester. When we made this change we hypothesized that by seeing the students twice a week we would be able to build better relationships with students and encourage class participation and practical course application. Further we felt that all of the information we were presenting to students needed to be implemented as soon as possible to help them on their road to academic recovery; with this in mind being able to condense the content to the first eight weeks of the semester was also beneficial. The primary drawback for this structure is losing required contact with students in the second half of the semester.

In general we did find that making this change induced better student participation in class (positive attitudes, more involved class-discussion, homework quality, etc.): that along with the benefits of presenting time-sensitive topics as soon as possible outweighed the negative outcomes related to not having required contact with students all semester.

Course Recruitment & Enrollment

When the course was originally developed it was not a required course. Students had the option to take the course if they have earned between a 2.0 and 1.0 GPA in their first semester (at that time students who earned less than a 1.0 were automatically suspended for the following regular semester). To encourage students to participate an email was sent directly to students from the College of Engineering

encouraging them to enroll, and for students whose FERPA status would allow, a letter was sent home to their parents alerting them to the opportunity to enroll in the class. This model of recruitment was successful and continued until the spring of 2011. In 2012 the recruitment email to students was sent out later in the semester and a letter was not sent home to parents and voluntary enrollment was greatly reduced (see Table 1).

In the spring of 2013 the course became mandatory for two groups of students: 1) students who had earned less than the required C minus in the first semester introductory engineering course and 2) students who had earned less than a 2.0 GPA in their first semester. Students who fell into one of these two categories were required to take the course if they wished to continue in the College of Engineering and transition from the EFY Program into a degree-granting engineering major. This change yielded a higher percentage of student enrollment. We feel this change was positive because it decreased the amount of staff effort in regards to recruiting for the class and it required students to participate who might not have otherwise taken the initiative.

You can see from Table 1 that fewer and fewer students were eligible to enroll in this course each year and we attribute that to several factors including: more higher achieving students being admitted to the University each year, policy changes that require or encourage students not to take courses for which they are unprepared (e.g. binding chemistry placement exam, etc.). Students who chose not to enroll in the course prior to 2013 may have attempted to continue in Engineering, transferred to a non-engineering major at the University or stopped attending the University. Students who chose not to enroll in 2013 and beyond either stopped attending the University or chose to pursue a non-engineering major at NC State.

Spring Cohort Year	First Year Total Enrollment	Percentage of Students E122 Eligible	Percentage of Students Who Enrolled
2008	1412	15%	n/a
2009	1370	12%	5%
2010	1387	14%	2.2%
2011	1337	13%	3.4%
2012	1358	8%	1%
2013	1373	8%	5%
2014	1190	6%	4%
2015	1465	6%	4.7%
2016	1331	6%	4.5%

Table 1: Percentage of student enrollment by year

Cohort Year	Eligible for Enrollment	Not Taken	Taken
2008	209	209	-
2009	162	94	68
2010	197	165	31
2011	172	127	46
2012	114	101	13
2013	108	37	70
2014	70	24	47
2015	91	22	69
2016	78	18	60

Table 2: Number of students enrolled by year

Course Content

When E 122 was originally created it was done so as a collaboration between the College of Engineering, Enrollment Management and Retention Services, and Academic Support Programs for Student Athletes (ASPSA). Enrollment Management and Retention Services wanted to pilot a support program for students they felt were at risk of leaving the University. They identified unmatriculated, first-year students, who struggled academically as their target audience and then reached out to the College of Engineering because we are the largest college on campus and have a challenging first-year curriculum. Academic Support Programs for Student Athletes (ASPSA) was recruited to be part of this effort because they already taught several academic support classes along with additional intervention programs for their student-athletes.

The first course (spring 2009) was created primarily using a template that was used in similar ASPSA courses and included class participation, four journal entries, two individual conferences and a final project that required students to create a “strategies for success learning plan.”

There were additional in-class assignments, but those were not initially included in the graded portion of the class. The journal entries involved reflecting on our in-class subjects including: learning styles assessments and application, emotional intelligence, career development and goals setting, self-awareness, course planning and GPA calculations, academic planning and advising, employing interdependence, and developing an academic recovery plan. Engineering staff felt the first iteration of the course was lacking in applicable content and focused too much on reflection alone. The second iteration (spring 2010) of the course content was much more developed, included more structure, in-class assignments and homework and more applicable skills such as stress management.

As we assessed the course in its new and improved form over the years we continued to look for areas where our students struggled and how we could improve the course to meet their needs in those areas. To assess where our students were continuing to struggle we implemented an assessment tool at the beginning of the semester to poll students about topics that typically impact academic performance such as time management, stress management, attendance, study skills, etc. This tool gave us great insight into the areas where students needed the most support and improvement. We used this information to inform our teaching topics and made sure to let students know how the class as a whole addressed the assessment questions, so they understood many people were struggling in this area and that is why we

were asking them to focus on these learning outcomes (see Chart 1). In implementing this assessment the course content shifted again (spring 2014) with a focus on making students aware of support resources on campus and on actionable, skills-based content. Topics included: academic policies, time management, learning styles, goal setting, study habits and skills, personal finance, stress management, test anxiety and exam preparation, etc. On-campus resources that were reviewed included: the Undergraduate Tutorial Center, the Counseling Center, the Career Development Center, etc. With the introduction of this new content some previous content was removed such as the journaling assignments as well as the individual conferences. We replaced journaling with skills inventory reflections for students to complete. We do feel that the individual conferences added value to the course and if faculty and staff resources allow we do recommend including these meetings in a first-year-recovery course.

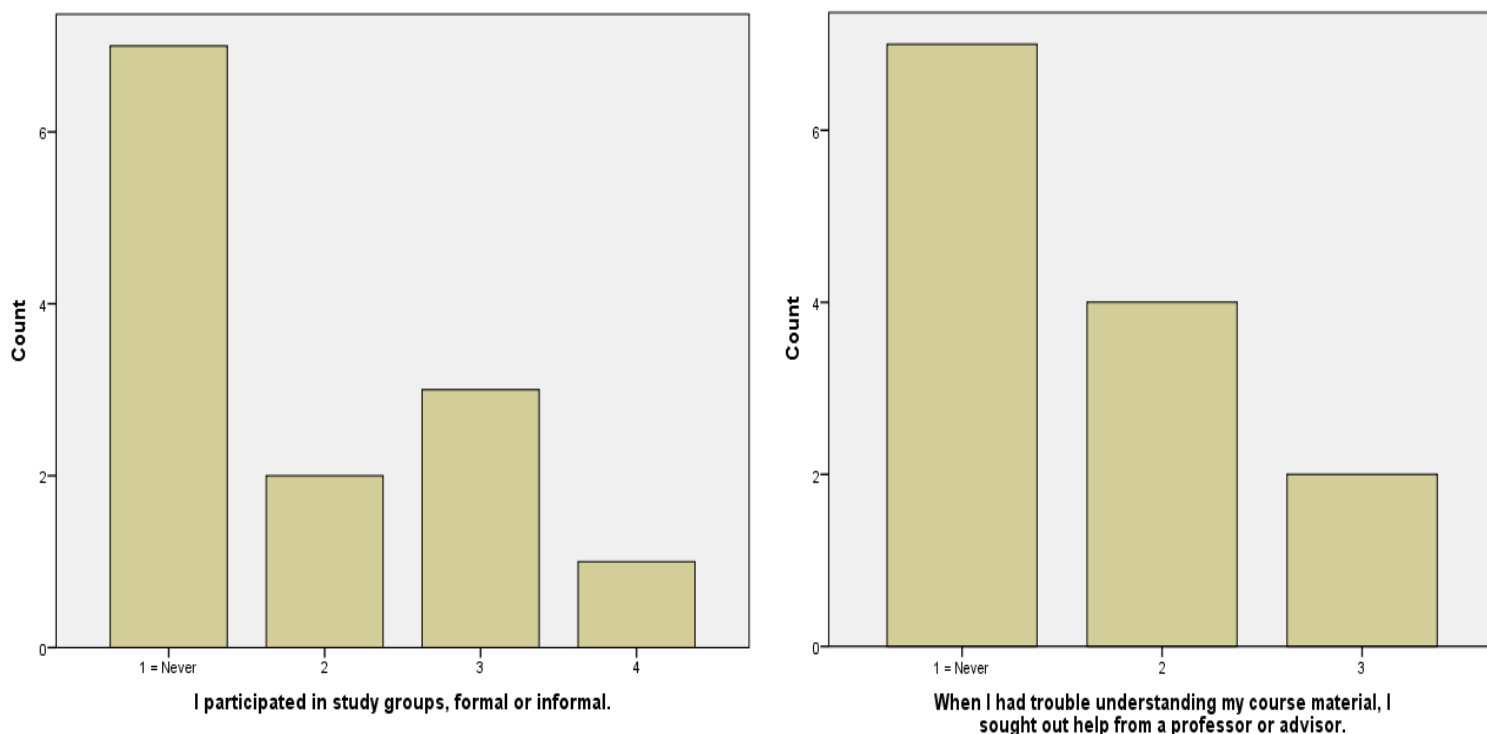


Chart 1: Examples of academic assessment student responses being used to inform instructional topics and frame course content as needed.

Course Instructors and Support

As previously mentioned the course began with support from the College of Engineering, Enrollment Management and Retention Services and ASPSA. Initially there were three to five instructors per section with representation from each of these groups. Eventually, in the spring of 2013, the course was handed over to the College of Engineering exclusively. Since that time we have maintained two instructors per E 122 section to ensure an excellent student to faculty ratio. And although it is now College of Engineering Academic Affairs staff who exclusively teach the course we lean on the expertise of others in the University to present in their specific areas of knowledge. We have staff from the Counseling Center discuss counseling center services, stress management and anxiety. We also have Counseling Center staff spend a session doing meditation with the class. The University Tutorial Center

speaks with students about their services along with information regarding study skills and habits. We have found this balance to be a great use of the resources on our campus, and a way to help students gain skills and feel more comfortable reaching out to these resources outside of class.

Outcomes, Observations and Paths Forward

After eight years, and several iterations of this course we feel that the structure and content work well for our students and have helped many of our students gain the skills necessary to move past the academic speed bump that impacted their first semester of college. It is the heavily skills-based iteration from spring 2014 and beyond that we feel has the most effective and applicable content for our engineering students. That said, there are still students who enroll in this course who do not continue at the University for a variety of reasons that range from mental health and medical issues, to a lack of motivation or maturity.

In general we have found that students who engage in this course are more likely to be retained in Engineering in the second year, but that number drops substantially in subsequent years. The overall retention at the University is higher, which is to be expected (see Table 6 & Table 7).

		Engineering Retention					
		2nd Year		3rd Year		4th Year	
Spring Cohort Year		E122	No	E122	No	E122	No
2008	n	-	142	-	94	-	60
	%	-	67.94%	-	44.98%	-	28.71%
2009	n	43	76	24	50	16	27
	%	63.24%	80.85%	35.29%	53.19%	23.53%	28.72%
2010	n	26	98	15	58	7	40
	%	83.87%	59.39%	48.39%	35.15%	22.58%	24.24%
2011	n	31	60	22	36	13	27
	%	67.39%	47.24%	47.83%	28.35%	28.26%	21.26%
2012	n	10	57	4	31	3	18
	%	76.92%	56.44%	30.77%	30.69%	23.08%	17.82%
2013	n	50	10	25	8	19	2
	%	71.43%	27.03%	35.71%	21.62%	27.14%	5.41%
2014	n	40	10	25	4	12	2
	%	85.11%	41.67%	53.19%	16.67%	25.53%	8.33%
2015	n	49	10	14	4	-	-
	%	71.01%	45.45%	20.29%	18.18%	-	-
2016	n	37	6	-	-	-	-
	%	61.67%	33.33%	-	-	-	-

Table 6: Retention in the College of Engineering by year and E122 participation

		University Retention					
		2nd Year		3rd Year		4th Year	
Spring Cohort Year		E122	No	E122	No	E122	No
2008	n	-	147	-	118	-	109
	%	-	70.33%	-	56.46%	-	52.15%
2009	n	44	76	34	67	32	60
	%	64.71%	80.85%	50.00%	71.28%	47.06%	63.83%
2010	n	26	102	21	81	20	75
	%	83.87%	61.82%	67.74%	49.09%	64.52%	45.45%
2011	n	32	68	30	57	27	48
	%	69.57%	53.54%	65.22%	44.88%	58.70%	37.80%
2012	n	10	60	6	49	6	37
	%	76.92%	59.41%	46.15%	48.51%	46.15%	36.63%
2013	n	54	12	40	13	41	10
	%	77.14%	32.43%	57.14%	35.14%	58.57%	27.03%
2014	n	40	12	29	10	22	8
	%	85.11%	50.00%	61.70%	41.67%	46.81%	33.33%
2015	n	53	10	41	5	-	-
	%	76.81%	45.45%	59.42%	22.73%	-	#VALUE!
2016	n	43	8	-	-	-	-
	%	71.67%	44.44%	-	-	-	-

Table 7: Retention in the University by year and E122 participation

To improve our course for first-year students in the future we plan to ensure that our class sizes have 20 to 30 students. We have found that classes of less than 20 students do not have good in-class discussions, which erodes class participation. Additionally, we plan to revive the individual conference as we found it was a great tool to get to know students on an individual level and allows instructors to be able to counsel or refer students to the most appropriate resources and opportunities on campus. Once our eight week class ends we send students one to three follow up emails in the latter half of the semester, but we are considering other means of increasing student contact during the second half of the semester.

In conclusion, an academic support course for first-year students can be beneficial for student support, which leads to increased retention. Our suggestions for best practices includes a course structure of a graded, eight-week course that has class sizes of 20 to 30 students with two or more instructors. We suggest a course content that utilizes assessment tools to consider topics related to student success and is heavily focused on skills building. Further we suggest utilizing campus resource experts to help students grow in their area of expertise and encourage students to seek out resources available on your campus.