

First Year Experience Activities in an Introduction to Engineering Technology Course

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Abstract

Central Connecticut State University has a well-developed First Year Experience (FYE) program. The university designates certain first-year courses as containing FYE elements. All incoming CCSU students are required to select one FYE course during their first two terms at the university. Prior to these course offerings, instructors select from a list of activities aimed at easing the assimilation of students to the university environment and ultimately increasing student retention and success.

An engineering technology department typically offers very few of its own courses to students during their initial terms on campus. One candidate course has proven ideal for inclusion of such FYE activities at CCSU. Our “Introduction to Engineering Technology” course is an entree into developing problem-solving skills and applying those techniques to general engineering subject matter. Open to the entire university and void of any prerequisites, the introductory course has been popular and often served as a valuable recruitment vehicle for our program. Inclusion of this course into the FYE program even necessitated the opening of an additional FYE section, which was easily filled.

New activities introduced into the classroom could be classified into three categories: informative, instructional, and support services. Informative elements included a general engineering technology curriculum review, a welcome and membership invitation by student leaders of the technical student organizations on campus, and a session with the Career Services organization. Instructional workshops were given on required academic integrity, proper time management, and the role of the Myers-Briggs Type Indicator (MBTI) in design team building and team dynamics. Several student support services of the university were introduced specifically those of The Learning Center and those offered by Prevention and Counseling Services.

Conclusions are based upon general assessment of the CCSU FYE program, and a review of results from initial class surveys.

I. Introduction

It is a fundamental conviction that engineering design can always be better. This is also the case in engineering education; it can always be improved for the target recipient. According to Upcraft and Stephens²², teaching in today's environment, however, is much more challenging due to the changing nature of the first-year student. They list a multitude of changes which have transpired when comparing college students today with those of forty years ago and conclude, "Our success with students depends on our clear understanding of how today's college students have changed, an acceptance of those differences, and a willingness to adapt our teaching to meet these new realities."

First Year Experience (FYE) is an effort of national proportion to ease the transition of such first-year students to the university environment and ultimately increase student retention and success. The FYE program at Central Connecticut State University (CCSU) integrates an extended orientation program into a regular introductory first-year course. All incoming first-year students must take an FYE-designated course in one of their first two terms at the University.^{23, 25, 26} According to a General Education Review prepared at a sister university²⁶, CCSU "has been nationally recognized for its unique First Year Experience program ... integrating the syllabus of a first-year experience orientation course into a 'freshman only' section of a traditional introductory-level course."

Registration for FYE courses at CCSU is often quite competitive, especially during the first term when the exposure would be most beneficial. In an effort to accommodate the FYE requirement for its own students, the Engineering Technology (ET) Department wanted to establish an FYE-designated course offering. Although an engineering technology department typically offers very few of its own courses to students during their initial terms on campus, one candidate course has proven ideal for inclusion of such FYE activities at CCSU. Our "Introduction to Engineering Technology" (ET 150) course is an entree into developing problem-solving skills and applying those techniques to general engineering subject matter. Open to the entire university and void of any prerequisites, the introductory course has been popular and often serves as a valuable recruitment vehicle for our program.

Traditionally, in ET 150, instructors base classroom lectures and activities around a text by Eide et al.⁴ which includes topic headings on the engineering profession, the design process, engineering solutions and problem-solving format, dimensional unit conversions, statistics, mechanics, electrical theory, mass balance, and energy concepts. The resulting learning outcomes or capabilities for students upon completion of this class are to:

- Distinguish between engineering disciplines
- Make judgments consistent with expected engineering professionalism and ethics
- Use engineering method and format for problem solving and solution presentation
- Collect and record data, represent data graphically, and analyze data statistically
- Forecast elementary engineering related phenomena
- Properly express dimensions in customary and international (SI) units of measure
- Apply basic engineering concepts and formulae to machine and process design
- Work in teams

Upon inclusion of an ET 150 section into the FYE program in the Fall 2003 semester, the class filled immediately and further demand necessitated the opening of an additional FYE section. Opening a new section rather than increasing class size was consistent with the CCSU FYE criterion for smaller class sizes (typically about 25 students maximum). All FYE course sections are for first-year students only and the ET 150 sections were specifically earmarked for students indicating engineering technology among their primary choices for major.

Review of recent relevant literature reveals many efforts undertaken at various institutions with similar goals for engineering and engineering technology programs. A most basic effort is the idea of advisor seminars developed for students at MIT where small student groups convene with a faculty advisor and an upper class associate for advising and review of various leader-chosen engineering seminar topics to solicit excitement about engineering.¹⁴ Others have instituted first-year seminars for orientation advising and to give a brief introduction to the engineering disciplines, and many incorporate the use of additional FYE activities.^{3, 9, 10, 12, 13, 15, 16, 18, 19, 27, 31} Like CCSU, many engineering and engineering technology programs begin their curriculum with an "Introduction to" course, quite often accompanied by a first-year seminar.^{2, 6, 7, 15, 18, 28, 29, 30, 32} Numerous programs quote the use of FYE efforts or merely list such elements in their descriptions or syllabi associated with their seminar or introductory courses.^{1, 6, 8, 9, 10, 12, 15, 18, 19, 21, 28, 29, 31} Improved variations of the introductory course have been suggested which are laboratory-based to stimulate interest^{1, 3, 7, 13}, or which emphasize the development of problem-solving skills^{3, 9, 10, 11, 17, 18, 28, 29, 30}, and finally those which place design in the initial year.^{9, 10, 15, 17, 20, 32} An interesting further refinement for problem-solving courses utilizes self-paced mastery of subject matter at Baylor University.³⁰ Although not completely unique, the new program at CCSU joins the small subset that integrates first-year experiences into its problem-solving introductory course. Additionally, the culminating team design project which uses several learned problem-solving principles and skill sets seemingly makes it special compared to programs in the literature surveyed.

II. First Year Experience Activities Introduced

Instructors for FYE sections of courses at CCSU receive training prior to their course offerings. This training imparts a better understanding of first-year students, provides a specific profile of the CCSU student, and reviews the results of surveys given to FYE student populations. Upon training completion, faculty choose from a number of potential orientation activities which can be added to their syllabi with the goals of easing the transition of incoming students to college life and ultimately increasing student retention and academic success. Activities chosen for the Introduction to Engineering Technology course could be classified into three broad categories: informative, instructional, and student support services.

a. Informative Elements

Curriculum Review – The University's Advising Center frequently addresses FYE classes in an effort to review the general education requirements, provide resources for career exploration, and impart strategies for course selection and curriculum completion. Since the ET 150 FYE

sections were filled with students who had already chosen their major (career) and all ET instructors act as ET student advisors, a formal review of the engineering technology program curriculum was made in lieu of the standard activity. This review introduced the general education requirements specific to ET along with the requirements for the major and the sequence of courses enabling program completion within four academic years. A sense of community can be established through this initial activity.

Student Clubs/Organizations – Collegiate belonging is also often established through participation in student organizations. The listing of the University-recognized student organizations/clubs was distributed to the classes and those organizations sponsored specifically by Engineering Technology were given special attention. Student leaders of the ASCE (American Society of Civil Engineers) and SME (Society of Manufacturing Engineers) organizations addressed the classes, offering a warm welcome to the University, societal membership invitation, and upcoming meeting information.

Career Services – To augment discussions of the engineering profession, staff members from our campus career services organization were invited to address the classes. Lively discussions revolved around future cooperative education opportunities and permanent job prospects. Students were gratified to learn of the superior placement and potential salaries obtained by graduates of their chosen field.

Library Familiarization Tour – A university research librarian provided an in-depth tour of the main library focusing on the technology book and journal reference holdings. The use of the library web-page and digital journal search engines was also demonstrated at great length. The information learned here is subsequently reinforced during the search phase of an engineering design group project.

b. Instructional Elements

Academic Integrity Workshop – Complementing discussions on engineering professionalism and ethics, a course learning outcome, the Academic Integrity Workshop offered by the campus Learning Center provides students with a review of their rights and responsibilities as specifically documented in the student handbook. Misconduct dilemmas, including cheating and plagiarism scenarios, are introduced to students for their assessment and the acceptable student behavior is ultimately confirmed.

Time Management and Learning Styles Workshops – The FYE sections of ET 150 also took advantage of these two other workshop offerings of the Learning Center to foster practices for success. Daily work plans can be prepared after considering time requirements for personal lives and commitments for all coursework assignments and exam preparation. Concepts of learning motivations (locus of control), learning modality preferences (auditory, visual, and kinesthetic), and brain dominance (analytical versus global behavior) were introduced so that strategies and recommendations for individual learning styles could be understood and adopted by students.

Myers-Briggs Type Indicator (MBTI) – Eide et al.⁴ consider the applicability of this popular method for establishing personal styles inventory (preferences) to design team mix. MBTI questionnaires were completed by class participants and confidentially evaluated by the University's Advising Center. The review process provides an understanding of one's own personal preferences, a realization of the strengths of others, and an appreciation for diverse membership in a team effort. This activity facilitates team building and the potential for more positive team dynamics for the engineering design group project.

Alcohol 101 – FYE class presentations in this area are conducted by a prevention specialist from the Prevention and Counseling Services organization utilizing CCSU student data in combination with materials designed to positively influence the social behavior of students. Training is held in computer classrooms to include interactive situational simulations on this topic.

c. Student Support Services

The full array of additional support services available to students through The Learning Center (master student course, study skill tutorials, and math tutoring), Prevention and Counseling Services (personal counseling, natural helper and peer educator programs, disorders and drug abuse awareness days and web-based risk assessment) and Career Services (career counseling, resume preparation and referral, interview skills development, internship and coop programs, employer and job information, and on-campus recruiting) were also identified during the term.

III. General Survey and Activities Assessment

a. General University Survey

The University conducts a survey of FYE classes each fall to gain its incoming first-year student profile and to evaluate the effectiveness of the program. In the ten years since the program's inception, FYE students report that for problems experienced they receive significant advising and that they have been helped developing many skills to succeed (note taking, library, computing, studying and exam taking). Most recently 60% of those surveyed felt that the smaller classes with other first-year students were beneficial to their college acclimation. FYE students also reported gaining more university familiarity and feeling more comfortable at CCSU.^{5, 24}

b. Engineering Technology Course Assessment

An assessment survey was also given to students in the engineering technology first-year experience program to evaluate the effectiveness of (or need for) the activities or elements chosen for inclusion in this initial course offering. Two questions were posed for each item. The first question dealt with the activities' importance to the first-year student becoming or feeling a part of the CCSU community. Students rated the activities on a scale consistent with the Engineering Technology Department's accreditation and university assessment rubric. Fig. 1 reports the average ratings obtained for each activity. From the data we see that most items were ranked as important, with the Career Services meeting, the ET curriculum review, and the library tour receiving the top ratings. The second question asked the students to assess the helpfulness

of the each activity to their success. Fig. 2 reports the average ratings obtained for each activity. From the data we see that most items were ranked as being helpful, with the library tour, Career Services meeting, and the Learning Center review of support services given the highest rank.

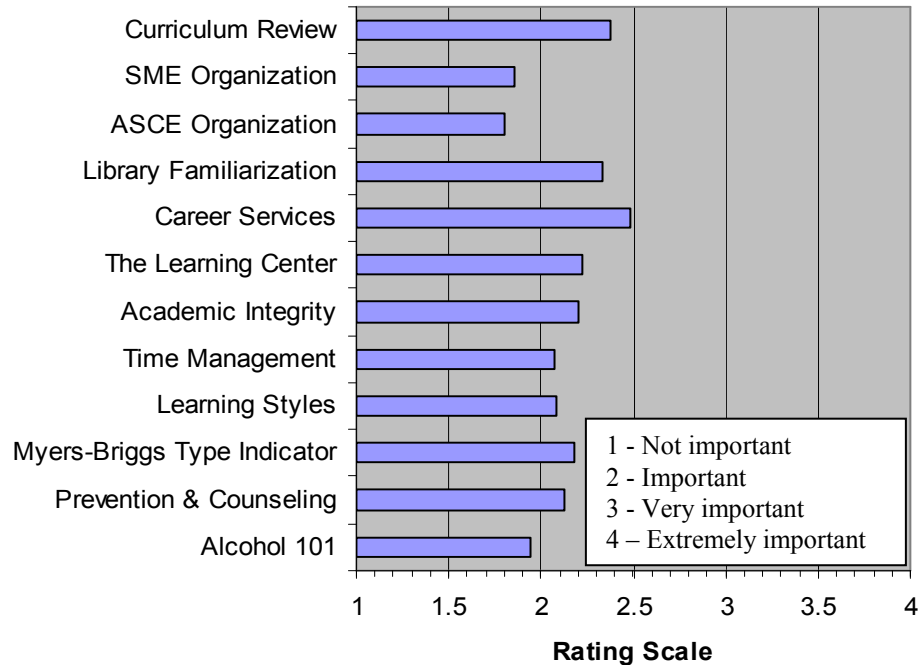


Fig.1. Assessment of each activity's importance in becoming part of the CCSU community.

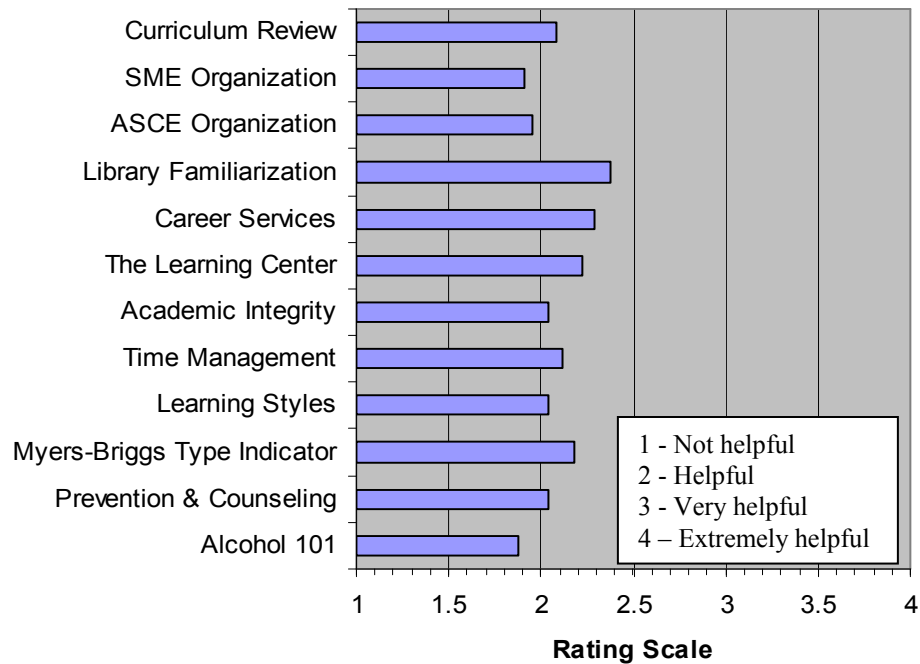


Fig.2. Student assessment of the helpfulness of each activity to their success.

Three items on average fell slightly below the minimal response desired on both questions. Given the limited sample size, we hesitate to draw conclusions for these lower scores. In the case of the presentations by student technical societies it may be that they have less perceived value to the first-year student although exposure is still beneficial. Also, considering the minimal time requirements, continuance of these activities is probable. Alcohol 101 training, however, occupied an entire class period and this activity will be monitored to see if future average responses continually fall short.

c. Retention

Although direct linkage between retention rates and the University FYE program is not available, the results from a question posed to students in the general university survey offers insight into the value of this program in this regard. When asked if they were eager to complete their education at CCSU, students who had taken the first year experience responded markedly higher, 59.4% (average 1994-2002) versus 52.7% (average 1994-1996), implying higher retention rates.⁵ When this FYE version of our introductory course is mature enough to be evaluated for retention rates, it should be compared to our non-FYE version. It is our hope that this evaluation will further justify our inclusion of the FYE elements.

d. Instructor Perspective

The methodology chosen by CCSU for program implementation, i.e., leaving the choice and number of elements up to the discretion of the offering professor is quite desirable. One has the flexibility to choose items that integrate well with the course subject matter without adversely impacting course delivery. Some FYE topics such as the curriculum review, technical society introductions, and the Myers-Briggs test, which were already part of ET 150, were now more formally presented. Most FYE activities required only 15–30 minutes to include; the exceptions were the library tour, Myers-Briggs profile, and Alcohol 101 which each required a full one-hour class period. Incorporating FYE into ET 150 did mean that one optional course topic could not be covered, but the instructors felt the benefits far outweighed this loss.

IV. Conclusions

Efforts to accommodate the needs of incoming engineering technology students for a departmental First Year Experience course were rather successful at Central Connecticut State University. Establishment of a first-year and ET-majors-only FYE course offering was found by instructors to further enhance the introductory course experience. FYE orientation activities specifically chosen for inclusion to the traditional “Introduction to Engineering Technology” course were of an informative, instructive, or supportive nature for students. Generally, these additions were found to aid in transitioning students to the college environment at CCSU and were helpful in contributing to student success. Given this initial effort, the ET Department plans to continue offering FYE sections of its introductory course to achieve the ultimate goals of the FYE initiative, i.e., ease of first-year transition to the university setting, and greater student success and retention.

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