Freshman Cornerstone Course Meets Multiple Educational Goals

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Introduction

Many disciplines offer cornerstone courses. The goals for these courses typically include 1) helping students develop a vision of the profession, 2) leveling and 3) acquainting the students with the faculty. Each of these goals is important.

Developing a vision of the profession enables students to decide whether their chosen major is well-suited to their individual aptitudes and interests. This in turn decreases student confusion and indecision, thus decreasing the number of semesters students take to graduate. There are concomitant decreases in student attrition and cost per student.

Leveling (the process of bringing all students to essentially the same skill/awareness level) ensures that all students have a common base thus diminishing frustration of both the advanced and the less well-prepared students. The instructors of subsequent courses can expect all students to be competent with a basic set of educational "tools" or skills.

Research shows that cornerstone courses have, in general, been successful in meeting one or more of these objectives[1,2]. Brigham Young University (BYU) has developed a course to address all three of these goals. In addition the BYU faculty has jointly and comprehensively reviewed the syllabus to identify those skills which can and should be taught at the freshman level. We have also identified a mechanism whereby these skills can be blended into a single coherent freshman course.

Students can establish relationships with faculty early on. This not only exposes them to different teaching styles but also to faculty who are enthusiastic about specific technical topics. It also helps students and faculty to develop mentoring relationships around common interests.

Freshman educational needs

College freshmen are often considered to be more "at risk" than other college students. The term "at risk" in this context encompasses several meanings, such as high drop-out rates, lower grades or other contributing factors such as inadequate study skills or personal habits, all of which may lead to disappointing performance.

BYU and other universities permit and even tacitly encourage students to explore various major options in the first year of study. BYU students are permitted to register as "open majors" and to change their major with very little cost or effort. However, freshman courses do not always supply the information that students need to help them choose an appropriate major. This can be particularly true in technical majors where required basic science and technology courses fail to capture the excitement of later courses and the profession as a whole. Studies also suggest that early classroom experiences in the required science courses may be intimidating rather than inviting[3].

Engineering technology students have an additional risk factor. It is the nature of engineering technology courses at four-year institutions to be lab-intensive, even in the first two years of study. Many students find these courses challenging and time-consuming compared to other courses they take in their first two years[4]. If these students are not strongly committed to their chosen courses of study there is a temptation to change majors.

Freshmen also enter their chosen majors with a wide diversity of backgrounds and technical skill sets. Those with the background and set of skills best suited to their major have an increased probability of success. Conversely, students lacking the appropriate background or skill set are challenged from the start, and have to work harder to succeed.

Another consideration is the fact that many upperclassmen report having learned a certain fact or skill late in their time at the university, and regret not having learned it earlier. Many of these facts or skills are simple, and can be taught to entering freshmen, thus paving the way for future progress. Thus, there exists a need to provide freshmen students with more "tools for success." This need is often met with 100-level courses in university studies, which are general enough to be taken by students of any major and are sometimes required for all freshmen students.

The needs common to freshmen students can be summarized into three groups: 1) general tools for success; 2) major-specific tools for success; and 3) vision of chosen major.

Development of Course

When an introductory course for Electronics Engineering Technology (EET) students was first proposed, one of the primary concerns was to avoid adding further requirements to an already full curriculum. At the same time, it was believed that such a course was greatly needed, so further attempts were made to define and fit the course into the curriculum.

In order to make room in the curriculum for this cornerstone course we moved some of the leveling previously done elsewhere into this course. Because this was done in conjunction with a restructuring of several courses in the major, it was possible to re-allocate the credit hours. This freed credit hours in the syllabus, making it possible to offer this course. Faculty agreed that students would perform better and that subsequent courses could be taught in less time if all incoming students were knowledgeable in areas such as DOS™, Windows™, word processing, spreadsheets, the Internet, PSpice™, MathCAD™ and/or MatLab™, Unix, and programs for

drawing schematic diagrams and other figures. Other topics deemed essential to the freshman experience included teamwork, analytical thinking, problem solving, oral report presentations, technical report writing, locating technical references (library and Internet), creativity, estimation techniques, and study/test-taking skills.

Much of the agreement among EET faculty at BYU as to the current structure and content of an introductory course was reached after most of the faculty had had an opportunity to teach the course in an earlier form. The faculty members, therefore, entered discussions about this course after having seen the needs of incoming students and having attempted to meet those needs during a given semester. This was an important part of arriving at a consensual definition of the course.

Present Course Description and Implementation

The course that has been developed is offered as two credit hours, structured as two 2-hour sessions each week. This allows the flexibility of using only one hour per day if lecturing, or two hours per day if conducting lab exercises. The class size is limited (to approximately 40) to allow more personal interaction. The course is run by a lead professor, but each EET faculty member, as well as other guests, teaches portions of the course.

On the first day of class, students are formed into design teams of 3-4 students. Each team is given a team name (often chosen from the letters of the Greek alphabet), and each team is informed that they will need to choose a team spokesperson later in the course. Students are then introduced to the course via the course syllabus and schedule. To provide a unified focus and theme for the course, the students are told that they are all employed as professional engineering technologists assigned to complete a design project over the next 15 weeks. They are informed that most class assignments will revolve around this central theme. The final exercise of the first day is to introduce the design assignment for the semester. The design assignment presently is a portable device for measuring the height of a tall object (building, tree, etc.) This design incorporates fundamentals of the design process as well as introducing students to concepts in instrumentation, signal processing, embedded computer control and other areas. Although the technical coverage is fairly superficial, it is sufficient to make the students aware of topics to be studied in depth in future courses. This design also provides the unifying structure to bring together all the skills and tools covered in the course.

Students learn about the value and potential of teams, and some of the skills necessary to successfully work in teams; this helps them begin working with their teammates. As the semester progresses, students learn skills necessary to progress in the design assignment. When they need to learn about competitive products, they are introduced to Internet skills (searching the Web, email, chat groups) and library resources (data bases, reference books, engineering library specialists, etc.). When they need to organize the data they have gathered, they are introduced to spreadsheets and are given an assignment to organize their data using one. When they need to write a status report, they are introduced to word processors and are given an assignment to write a memo similar to an example passed out in class. This continues until all the major-specific tools discussed earlier have been covered.

Most of the presentations of major-specific tools are given by other EET faculty, who first introduce themselves and tell some of their background and interests. Since all EET professors have had significant experience in industry, this provides an opportunity for the students to gain a broader vision of their major and what some potential jobs might be like, thus providing some of the "vision of chosen major."

Additional lectures are presented on a broader perspective of engineering as a profession. The text is drawn upon for much of the material in this area. The text chosen for this course is from the Addison-Wesley Publishing Company's "Engineer's Toolkit" series, which allows instructors to choose modules that fit their course. Many modules are available; our text was composed of the modules on Exploring Engineering, Engineering Design and Problems, Math Practice, Word Processing, DOS/Windows, Spreadsheets, and The Overview. Lectures in these topic areas draw on material in the text so that students become familiar with the text and are able to use it as a reference for future classes.

Further emphasis on design is provided in 2 or 3 more class periods with design team meetings, which are simulated in class using pairs of the assigned design teams working on status reports, design suggestions, architecture decisions, market analysis, and other design activities.

Additional lectures by both outside experts as well as the leading professor address study habits, test-taking skills, taking notes, and campus resources. This section also brings in the opportunity to discuss those general things that senior students know and wish they had known from the beginning.

Students also learn simple laboratory skills such as breadboarding (by breadboarding a simple 1-stage audio amplifier), soldering (by building a circuit board with a simple blinking LED circuit), and microprocessor programming (by modifying a simple melody program in a microcontroller programmed in BASIC).

A final effort to assist students in learning about engineering as a profession is provided in a class session known as "A day in the life." In this session, students come to class dressed as they would on the job. They engage in simulated activities characteristic of a "typical" day in the life of an engineer, all shortened to fit an entire 8-hour day into the 2-hour class period, regulated by a simulated clock. This effort involves teams, outside support (secretaries, food for breaks/lunch, handouts, etc.), and involvement of each student.

Upon completion of the course, students have been exposed to much material in all three need areas. The first need area, general tools for success, has been addressed in lectures, guest lectures, handouts, and assignments. The second need area, major-specific tools for success, has been addressed in the text, in lectures, guest lectures, labs, assignments, and in the simulated design experience. Finally, the third need area, vision of chosen major, has been addressed in the text, in lectures, guest lectures, labs, assignments, in the simulated design experience, and in the "A day in the life" experience.

Student and faculty response to the course

The general response to the course thus far has been very positive. A survey was taken at the completion of the 1997 Fall semester; pertinent results are shown in Table 1 below. The survey addressed several specific items in the class in addition to the general questions shown in the table; these are summarized in the final entry of Table 1.

Survey Question	Average Response*
I understand the field of Electronics Engineering Technology and how it relates to other disciplines	4.0
I feel better prepared for my university career	3.5
I know the professors in the major better	4.3
I feel I can approach the professors and talk to them about technical or other topics	3.9
Summary of other more specific questions	3.67

*1=strongly disagree; 2=disagree; 3=neutral; 4=agree; 5=strongly agree

Table 1. Summary of Survey Response

Most students feel positive about what the course has done to help them prepare for their time at the university. Each semester, however, there are those students who feel that a particular part of the class was unnecessary, such as Windows™ or Word processing. This is to be expected in a class where one of the objectives is leveling. We will address this in the future by having more challenging tasks available in each area to offer to those students who can complete the standard assignment in a very short time.

Faculty teaching subsequent classes have found it helpful, knowing that they can depend on students having had exposure to some of the major-specific tools for success. It has also made it easier for faculty to make assignments that require usage of major-specific tools.

Conclusion

We do not believe that the present course structure and content will remain unchanged, but we are confident that many of the needs of incoming students, as well as many of the skills helpful in subsequent courses, have been addressed in the present course. We believe that we have succeeded in significantly enhancing the students' ability to select the EET major with greater confidence and succeed in a shorter time. This has been done without adding extra hours to the required curriculum.

Bibliographic Information

1. “Freshman Seminar: A New Orientation”, by Robert D. Cohen and Ruth Jody; Westview Press, Boulder, CO; 1978.

2. “A Successful College Retention Program”, by Paul M. Dale, ERIC Document #ED380017; 1995.

3. “They’re Not Dumb, They’re Different: Stalking the Second Tier”, by Sheila Tobias, Research Corporation, Tucson, AZ; 1990.

4. Unpublished survey of two freshman EET courses, at Brigham Young University, April 1994.

Biographical Information

Barry Lunt is an assistant professor of electronics engineering technology (EET) at Brigham Young University. He has degrees from Brigham Young University and Utah State University. He worked as a design engineer with IBM for seven years, and has taught at the 2-year and 4-year college level for the past twelve years.

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2 Course Overview To meet the requirements of these emerging adults, a freshman transition course must address a combination of personal/social, educational, and career and life skills. In short, the coursework must: PERSONAL SOCIAL DEVELOPMENT Help students envision a future that is productive, achievable, and stimulating.Â certification/degree. E. Develop and analyze a budget for a single parent raising two children whose annual income is below the average in their community. F. Set goals for wellness practices to maximize present and future health, appearance, and peak performance. 02. The student completes formal assessments and surveys to help them establish and consolidate their identity, becoming identity-achieved. 3. Cornerstones of Assessment. Assessment and testing: many forms, same principles A good test is useful, i.e. Valid and reliable Practical Impactful Fair and secure Authentic. 4. 1. Validity.Â Assessment of course content with clear reference to goals and outcomes Use of formats and tasks familiar to students. 8. Face validity. The test looks as if it measures what it is supposed to measure.Â Multiple-choice questions are one way to ensure that a test is more reliable, but is it valid to test speaking or writing? The key principles of validity and reliability need to be weighed up against each other when we design a test. 20. 3. Practicality. We felt that a CREATE Cornerstone course focused on sci-entic thinking could support and build studentsâ€™ science interest at an early phase of their academic careers.Â CREATE Freshmenâ€”Thinking/Attitude Gains. Introduction to Scientic Thinking is a three-credit, one-semester elective for rst-year college students with a de-clared interest in science, technology, engineering, and math (STEM) disciplines at the CCNY, a minority-serving institu-tion. The course meets twice-weekly for 75 min/session, and on our campus is taken before the introductory-level courses in any of the basic sciences.Â Multiple-choice testing (often considered a practical requirement for a large lecture Multiple regression analysis shows that Social Information Processing has the most significant role among other dimensions of social intelligence. This dimension describes the ability to understanding various (social) messages in social environment. Thus, social intelligence development is imperative for enhancing the resilience of first year students in the university. For courses in First-Year Orientation, Student Success, Study Skills, Extended Orientation, Freshman Year Experience. The sixth edition helps students focus on practical strategies for CHANGE. Those who can master change with a positive attitude take calculated risks and maintain an open mind will succeed. Filled with inspiring stories and powerful activities, this motivating book teaches success through discovery, goal-setting and determination.Â BEGIN: The Goal of Cornerstone and Our Commitment to You. Features In each chapter: Why Read This Chapter.Â Understanding Multiple Inteligences to Enhance Studying and Learning. Understanding Learning Styles Theory. Wanted: A Visual Learner with Tactile Skills.