EET with A Specialty:
“The Coupling of an Associate Degree and A Certificate”

In a decade of declining engineering technology enrollments and engineering technology associate degree graduates one electrical engineering technology associate degree program sought to counter the trend. The method used was to implement technical specialty certificates that an engineering technology student earns while completing the associate degree. Some of the advantages of this approach are that the student earns an associate degree that is transferable into a four-year baccalaureate degree program and a technical specialty certificate in which a he or she gains practical and up-to-date technical skills. The degree/certificate combination allows a student the option of immediate employment upon graduation or transfer into a four-year program.

This article traces the development of a computer and network maintenance certificate and discusses plans for the development of an avionics certificate. These certificates were selected in an attempt to meet community needs, to collaborate with local businesses, and to provide EET students exciting and challenging educational and career opportunities. The first certificate discussed is Computer Systems Support, which is in place and receiving considerable interest on the part of students and employers. The second certificate, which is in avionics, will be proposed this year and implemented during the 2001-2002 academic year. A detailed discussion of the curricular, instructional and laboratory requirements of both certificates programs will be presented.

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Picture a growing two-year branch campus of a major urban university. Overall student enrollments since its inception have steadily, and at times dramatically, increased over a quarter of a century. It has constructed new buildings and facilities, developed and provided new technical and transfer programs, and established a working rapport with the community that it serves. Yet amidst all this plenty an important technical program lies almost dormant due to lack of interest on the part of potential students. The program has quality faculty, adequate facilities, and numerous employment possibilities for it co-op students and graduates. It is also providing
its few graduates with highly sought after technical skills, sought after locally, nationally and globally. Why, then, is the program so moribund? More importantly what can be done to revitalize it? This paper is suggests an answer to the first question. It also chronicles one institution’s response as a possible answer to the second.

The University of Cincinnati Clermont branch campus seems to fit the description above. It was founded in 1972 as a two-year branch campus. It is located in Clermont County, Ohio, the county to the immediate east of Cincinnati. Its enrollment has increased from about 500 students at the opening of its doors to approximately 2500 students today. It has steadily increased the number of transfer and technical programs and is ever vigilant to add either a traditional or innovative new program. It has at various times begun associate degree programs in industrial engineering technology, hospitality management, computer information systems, human services technology, biology, chemistry, allied health, nursing and aviation technology. Among the programs offered is electrical engineering technology. This program does have able and inspiring faculty, adequate facilities, and more need for its graduates and co-op students than it can meet. Yet, the program has had and continues to have relatively light enrollment.

It is not the purpose of this paper to give an exhaustive list of reasons why a program does not flourish, but to focus on more effective measures to energize such a program. However, some of the causes for low enrollment in engineering technical programs should be mentioned. Engineering and engineering technology programs do tend to have cyclic enrollments and popularity. This is partly due to the nature of the engineering field, which has periodically a greater or lesser demand for employment. Warfare and preparation for such conflicts have always been a stimulus to the scientific, engineering, and technical employment. The American Civil War, World Wars I and II, and of course the Cold War were periods of rapid and forced technical advancement spawning the need for more engineers. When the employment demand is up, more students seek training in just those technical and engineering fields and of course engineering schools respond. On the other side of the coin, when peace prevails, this demand may drop off. Specific fields are sensitive to cultural and economic trends. The national anxiety over the Soviet orbiting of Sputnik stimulated the engineering fields of aero-science, electronics, and computation. Environmental problems and crises actually spawned the field of environmental engineering. The Internet and the advent of multimedia applications have encouraged software engineering and hardware design and implementation. During periods of slower technical innovation the demand for these skills is lessened and fewer students see engineering and technology as attractive fields of employment.

The cyclic nature of technical innovation and development can explain times of lower interest in engineering fields. However, another factor is also apparent, especially to engineering and engineering technology faculty: most areas of engineering and engineering technology education require several years of hard work to begin to master. Critical reading and problem-solving skills are essential. Indeed much of engineering training involves years of disciplined and intensive study. Not everyone has the necessary combination of ability, interest, and self-discipline required for success. If any of these factors are missing, a student’s chances of graduating from
an engineering or engineering technology program are greatly diminished. So what can be done to increase interest in an engineering field?

The Computer Systems Support Certificate

UC Clermont’s response to these questions has been to add certificate specialties to its electrical engineering technology program. The first certificate added was in the area of Computer System Support Technology (CSST). This was a four-course sequence in computer and computer network support developed to train a student in computer system maintenance. The certificate was originally designed in response to a perceived global and growing need for this type of technical support. UC Clermont had also surveyed its local business and service sectors to discover that computer systems support was the most frequently stated employee need. The CSST certificate program and its curriculum had been developed with the close consultation of its advisory committee whose membership represented several Cincinnati area businesses and public institutions. The certificate curriculum consisted of the following four 4-credit hour lecture-laboratory courses:

- PC Operating Systems
- PC Hardware
- Basic Network Techniques
- PC Systems Troubleshooting

The courses were both comprehensive and practical in their application and students would also receive the training required for passing A+ Certificate, the most-recognized computer maintenance credential in the field. It is of some significance to note that the certificate curriculum was in place in less than a year after the employee needs survey was completed. UC Clermont was able to respond very quickly to its service area job needs. This also encouraged program awareness, enthusiasm, and support on the part of local businesses and potential students. Program promotion or marketing is made easier by a ready response to perceived need.

At the initial offering of the first course in the sequence, “PC Operating Systems”, the course closed at a maximum enrollment of 28 students. The course was offered again the following quarter and attracted high enrollment. The second quarter also saw the initial offering of the “PC Hardware” course. This course also filled to capacity, and we began to realize we were on to something. The certificate program continues to this day with high enrollments.

The certificate program suggested that a CSST associate degree program might be attractive. An associate degree program in Computer Systems Support Technology had been designed even before the certificate program was in place. It was approved and implemented by the beginning of the 1999-2000 academic year. The program has proven to be successful as measured by student enrollments, academic quality, and job placement.

A feature of that program is that many of the courses are electrical engineering technology courses such as digital electronics. Many of the students found themselves interested in majoring
in EET so as to continue their blossoming interest electronics. In addition to these new EET converts some of the EET students decided to add the four-quarter CSST certificate to their course load despite the fact that the CSST courses did not apply toward their EET associate degree.

By adding the CSST certification to their EET associate degree the EET student has multiplied his or her career options and made him or herself a more versatile, multi-skilled, candidate for job. An EET associate degree graduate who also has a CSST and A+ certifications can:

1. Transfer into a baccalaureate engineering technology program.
2. Enter the workforce as electrical engineering technician in a wide variety of technical fields such as field representative, test technician, production technician, designer, etc.
3. Enter the workforce as a computer support technologist.
4. Transfer into a baccalaureate engineering information technology program.

By including the CSST certificate as an option the EET graduate has effectively multiplied his career choices. If such options as pursuing a computer science, a baccalaureate engineering technology, or a related four-year degree upon graduating with an associate degree are considered, the graduate has many possible career paths. It also develops a more versatile employee.

There are difficulties with pursuing not just an associate degree in engineering technology but including the additional coursework needed to receive a specialty certificate. If nothing is deleted from the associate degree curriculum, the student must devote additional time, money and effort to earn the certificate. Of course one way to reduce this load would be to modify the associate degree requirements to include the certificate. However, such a modification would also imply dropping some of the associate degree requirements and including the certificate requirements. This can be done but it reduces the transferability of the associate degree graduate into a baccalaureate program because some of the basic requirements may be deleted. Though transferability may be affected, the associate degree graduate may be just as attractive to employers due to his grounding in both basic electrical studies as well as the certificate specialty. This suggests that the curriculum might be divided into three options:

1. Pursue the traditional engineering technology curriculum allowing the graduate to either seek employment in his field upon graduation or to transfer into a four-year engineering technology program.
2. Pursue the modified engineering technology curriculum which includes the specialty certificate and prepares the graduate for immediate employment in

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either the basic engineering technology field or in the specialty.

3. Pursue both the traditional engineering specialty and the certificate.

If creating a certificate option for students multiplies their career possibilities, then adding other certificate options continues this multiplication process. Not only does it add options for the student; an array of certificate offerings can be a powerful college marketing tool. The institution can present a much wider variety of career choices to the public and to the prospective student. The institution can also attract associate degree graduates from other schools who have an interest in the particular certificate specialty. Businesses and public institutions can offer their employees training to upgrade their skills in either the engineering technology or the certificate specialty or both. In seeking additional certificate specialties, UC Clermont decided to investigate offering a certificate in avionics (aviation electronics).

The Avionics Certificate

At the time of this writing the avionics certificate is still in the development stage. However, UC Clermont is planning to offer this certificate at the beginning of the 2001-2002 academic year. This specialty was chosen for a number reasons. The College already had established a viable pilot training associate degree program in cooperation with the Sportsman Market Company and the Clermont County Airport, both of which are within a mile of the campus. Sportsman’s Market is a supplier of pilot and aviation products. It is located at the Clermont County Airport. It also has an avionics shop, which provides avionics equipment installation, calibration, maintenance, and upgrades for its customers. There is a large and growing global need for skilled avionics technicians. There are several large aviation concerns such as Delta, Federal Express, and ComAir in the greater Cincinnati area all of which have need for avionics technicians. There is already an aviation technology (pilot training) presence at Sportsman’s Market, the Clermont County Airport, and UC Clermont. The management of Sportsman’s Market and UC Clermont are enthusiastic about developing an avionics certificate program. The EET program continues to produce electronics technologists who have the basic electrical and troubleshooting skills that avionics technicians need. Finally, UC Clermont is ever alert to developing and implementing technical options for its service area. All of the crucial ingredients needed for the creation of an avionics certificate program are present.

The certificate curriculum will consist of three or four courses to be taken during or after the sophomore year. The three main topics of these courses are:

1. Aircraft Electrical Systems

2. Avionics Systems
   a. communication and navigation systems
   b. aircraft pulse and microwave systems

3. Avionics Troubleshooting

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How these topics will be treated in each of the courses has not yet been determined. Since UC Clermont’s academic year is on the quarter system, one possibility is to devote a course to aircraft electrical systems, one to communication and navigation systems, and one to aircraft pulse and microwave systems. The avionics troubleshooting topics and skills could be developed into a one-quarter course or might be distributed throughout the three quarters. The troubleshooting skills should be developed as soon in the certificate experience as possible and should be applied primarily to the avionics certificate coursework.

There is also a need for adequate laboratory experience. However, Sportsman’s Market and the Clermont County Airport can provide the facilities for the lab by adapting their present avionics shop to include an instructional capability. Sportsman’s Market and UC Clermont have a fleet of ten aircraft that are used in pilot training instruction. These and other aircraft can provide actual platforms for avionics troubleshooting and maintenance. The pilot training program has already provided a contractual model for implementing the avionics program. It is a working example of collaboration between an industry and a public university and probably deserves recognition and study beyond mere mention in this article.

Another aspect of this particular industry and university collaboration is in the form of program promotion and marketing. Sportsman’s Market and UC Clermont together marketed the pilot training program. Sportsman Market focuses much of its efforts on advertising and catalog sales of its products. The growing success of this business is a testament to the effectiveness of the company’s marketing and product quality. However, marketing is not necessarily a public university’s strongest feature. Many of UC Clermont’s marketing efforts, though worthy, have not been sustained. However, Sportsman’s Market and UC Clermont have jointly promoted the pilot training program and with a great deal of success. Monthly meetings have fostered a successful and sustained marketing effort. The enrollment in the pilot training program has grown steadily and the program now has more than fifty student pilots in training.

Conclusion

We have seen how a rather stagnant engineering technology program can be revitalized by the addition of a leading-edge technology certificate program. The option of including this certification into an associate degree technology program gives the student a broader education and more diverse career choices. While the student learns the fundamentals of a particular technology, he or she also encounters an immediate application of these same fundamentals to a practical state-of-the-art technology. Not only does a student learn basic troubleshooting concepts, he or she immediately applies these skills to real electrical systems such as computer system support or aviation electronics. By collaborating with local or even national business or industry, the public educational institution gains much. A closer relationship with the community develops. Potential students become more aware of the public institution’s capabilities and resources. The society as a whole benefits by having technical specialists capable of performing a much wider variety of jobs. The student benefits by learning a greater diversity of skills and
developing more educational and career opportunities. Ironically, EET with a specialty becomes a more general education than either of its component parts might suggest.

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