

# Methods for Increasing Enrollment in a Telecommunications Engineering Technology Program

*Tom Fallon<sup>1</sup>*

## Abstract

After an initial surge in enrollment accompanied by a high retention rate, the associated numbers of the 4-year, multidisciplinary Telecommunication Engineering Technology (TCET) degree program, which is part of the Electrical and Computer Engineering (ECET) department, at Southern Polytechnic State University began to decline. Impact of a newer and similar degree, initial heavy market decline in the wake of 9/11, the dot-com bubble, and uncertainty in key degree-related terms were some of the important factors suspected of having combined to cause the enrollment decline. Having identified the potential causes, we, the TCET committee, developed a plan to reverse the downward enrollment trend while simultaneously improving the quality of the program.

After having established an online collaboration site we began to meet regularly to discuss the various aforementioned causes and specific methods by which they could be remedied. Research showed that growth trends in various areas of the telecommunications industry provided a potentially positive future for the TCET program. This research spurred discussion about marketing the program and creating a better interface to the industry. Another investigation revealed a misunderstanding of the term “telecommunications,” which likely contributed to confusion among prospective TCET students. We decided that a clear definition of “telecommunications” and how it differs from the term “information technology” should be introduced into marketing material and properly conveyed to key stakeholders including faculty, staff, and students.

The TCET degree was designed from a substantial set of Electrical Engineering Technology (EET) courses combined with a smaller number of telecommunications courses. Although several EET courses were required to establish the necessary technical foundation for the curriculum, additional telecommunications-related courses are needed to provide TCET students with a broader perspective of the telecommunications industry and associated technologies, which, in turn, will afford the students greater employment potential. Both of these benefits resulting from the addition of new telecommunications courses along with other key curriculum changes should directly, and positively, impact enrollment.

We recognize the need to improve our recruitment efforts among students who have either completed or are still enrolled in 2-year technical college programs, and who might be seeking a baccalaureate degree in the telecommunications field. As part of an outreach strategy to improve enrollment we are developing a plan to meet with recruitment officers and academic

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<sup>1</sup> Department of Electrical and Computer Engineering Technology, Southern Polytechnic State University, tfallon@spsu.edu

administrators of 2-years programs located at increasing geographical radii from our campus over a specified timeline of 5 years. In addition to the 2-year programs component, our strategy involves the recruitment of students interested in telecommunications, who are attending 4-year colleges at more remote campuses for whom a daily commute is not practical. In order to reach out to and serve both categories of students we have begun discussions on adapting certain TCET courses to an online format, and have begun to identify the technical challenges and solutions associated with such adaptations.

Although several excellent references exist which highlight the various means by which retention and enrollment of college programs can be improved [1, 2], we focus on only a few of the key enrollment-related activities that the TCET committee is pursuing. Enrollment data have shown apparent stabilization and, perhaps, a small increase in enrollment starting this past fall term. However, it is too early to determine how efficacious these new methods will ultimately be. Time will tell how well our plan was conceived and what additional changes will be required.

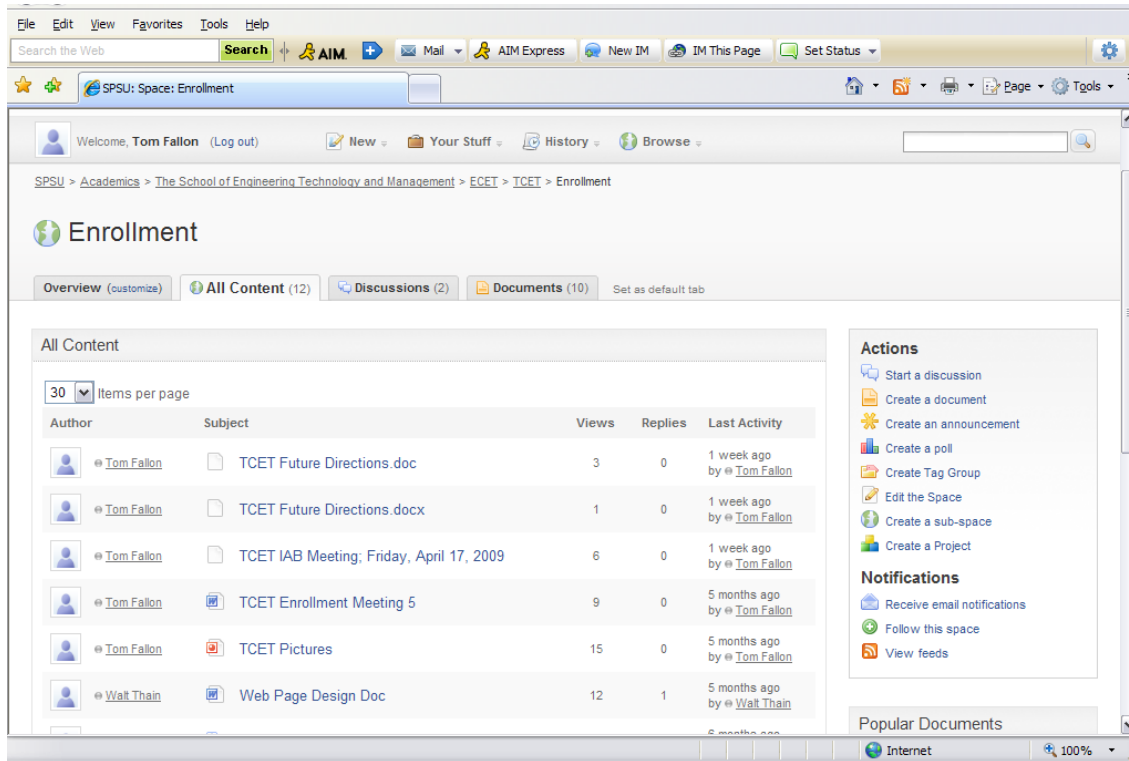
## **Introduction**

Over ten years ago, a multidisciplinary Baccalaureate degree program in Telecommunications Engineering Technology was approved by the University System of Georgia Board of Regents, and offered at Southern Polytechnic State University [3, 4]. The growth curve of the multidisciplinary TCET program had a rapid initial rise to approximately 100 students followed by a precipitous decline to approximately 30 students. As of last spring term, enrollment was at 34 students. The foremost set of tasks required of the TCET committee has been to determine the causes of the decline and articulate and implement a positive growth solution.

In this paper we will discuss some of the main discoveries related to the negative growth curve—primarily attributed to enrollment, not retention—of the TCET program, and the methods and procedures by which we intend to correct it. Although additional ideas, such as marquee and billboard presentations, are incorporated into the plan they will not be discussed. The key to the plan was to first build a collaborative working environment and then to understand the numbers.

## **TCET Portal**

To provide a common online work and document management area for researching and resolving the TCET enrollment problems, as well as other program-related issues, we asked the university's IT department for assistance in creating an online portal. Using a product called ClearSpace we initialized, configured, and secured our portal (see Figure 1).



**Figure 1: TCET Enrollment Portal**

The portal has enabled us to work in a more expeditious manner by making available access to shared documents and discussion groups, which previously would have required a network share, email attachment, and/or additional in-person meeting. In fact, at the beginning of a called meeting, the TCET committee member who is making the presentation only needs to login to the portal and begin his or her presentation. Ultimately we plan to create an online community for all members of the TCET program, possibly including the parents of current and prospective students.

### **The Numbers**

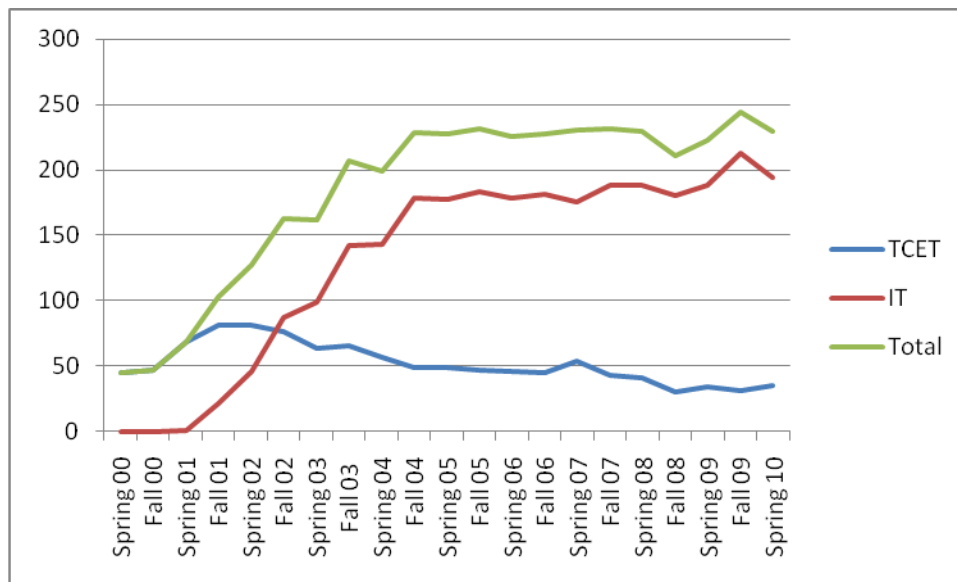
In order to elucidate the underlying cause of the negative growth curve we decided to extract and plot enrollment numbers from the online records database for each year since the TCET program's inception (see Figure2). The beginning of the decline in the 2001 to 2002 time period did suggest a possible relationship to the aftermath of 9/11 and/or the dot-com bubble [5]. Although we knew that several industries, indeed the whole economy, suffered greatly in the wake of 9/11, we still wondered about other potential causes; enrollment numbers usually go up in a falling economy.



**Figure 2: TCET Enrollment**

We believed that our degree program had been confused with other programs on campus for various reasons, and decided to investigate further. From Open House events we knew that prospective students sometimes confused our telecommunications degree program with TCOM (Technical Communications). Also, some students and parents asked questions that indicated confusion about the difference in terms “telecommunications” and “information technology.” Fortunately, for those students who dropped by our TCET exhibit section, we were able to explain the difference and similarities of the two fields. We began to wonder: “If prospective students were unclear about the definition of the two terms, then might enrollment personnel at our university and high school guidance counselors be as well?” Before we could address that question, however, we needed to verify if there existed a correlation between the enrollment numbers of the Information Technology (IT) and TCET degree programs.

Extracting the Information Technology enrollment numbers from the online records database and adding them to the TCET enrollment plot revealed that, indeed, there appeared to be a correlation (see Figure 3); as the IT numbers increased, the TCET numbers decreased.



**Figure 3: Correlation between TCET and IT Enrollment**

The TCET enrollment numbers reached their high watermark (81) during the fall and spring terms of the academic year 2001-2002. Thereafter they declined as the IT numbers increased, and leveled off at approximately the same time. Some important questions which have not been resolved are: i) what role, if any, did the difference in terms play in the loss of TCET enrollment? ii) Does the TCET curriculum require modification? iii) Is IT of greater interest than TCET to prospective students?

Surveys of current IT and TCET students could be used to help determine the exact cause of the divergent enrollment numbers. However, no such instrument has been used to date. We decided to focus our attention on the examination and modification of the TCET curriculum to accurately reflect potential growth areas in the telecommunications industry, proper clarification of the two aforesaid terms, increase of program marketing efforts, and provision of a better interface for enrolled students to the industry.

According to the Bureau of Labor and Statistics[6] (BLS) for the year 2006—the most current data posted—973,000 people were employed in the field of telecommunications with a projected growth rate of 5% between 2006 and 2016. In the occupation category “network systems and data communication analyst,” which corresponds closely to potential positions that our graduates might earn, the 2006 to 2016 growth is predicted to be 26.1%. While the industry as a whole realized a 25% loss in employment when the bubble burst, it has since experienced positive growth, particularly in areas such as wireless, cable systems, and security [7].

The BLS data strongly suggests that curriculum modifications emphasizing wireless and cable-based broadband systems along with new courses in network security would properly align our program with current industry growth projections. The TCET program already possesses aspects of all of these areas, but without sufficient emphasis.

In order to include these modifications without affecting the overall credit hours of the program, the TCET committee has sent the requisite curriculum modification forms to our Undergraduate Curriculum Committee for approval. At the time of this writing, approval is pending but expected soon. In addition to other modifications, the committee has requested approval for the creation of a new, required course, ECET 4860 (Network Security). The prototype for this course has already been developed and taught two semesters as a special topics course.

We hired a PhD candidate from the Georgia Institute of Technology's school of ECE, whose dissertation work is network security, as an adjunct instructor to create the network security course [8], which has been successfully received. Additionally, the same adjunct instructor has created a new course in wireless systems, which is being offered this semester, spring 2010. We have also hired a second adjunct instructor, who has developed and is currently teaching a course in internet applications and protocols. The creation of such an adjunct pool has enabled us to increase our curriculum offering, while not increasing the demand on our current TCET faculty, whose schedules are already full.

### **Coming to Terms**

Part of the problem of conveying the difference in the terms "telecommunications" and "information technology" was being able to clearly articulate their meaning to ourselves. Although we knew of the "big picture" differences--IT systems are typically enclosed within an organization network boundary, such as a campus, and telecommunication systems are typically the "glue" connecting them together, as in the Internet--we had to dig a little bit to determine exactly what we would present, in a straight-forward and concise manner, to prospective students and their parents.

With accurate verbiage in hand, we decided to discuss the difference in terms with enrollment personnel and administrators at the university so that our program definition is accurately conveyed via all enrollment avenues. We have requested a meeting with the VP of Enrollment after our upcoming spring break. He has agreed, and indicated that he will bring key members of his staff. Also, it was decided to include the verbiage in a Frequently Asked Questions section of our new TCET website [9] (see Figures 4 & 5), which was recently designed and activated, and in other marketing material such as brochures and ads.



Figure 4: New TCET Website



Figure 5: FAQ Page of the TCET website

## Other Avenues

Another avenue through which the definition of telecommunications is being reinforced is our undergraduate orientation course. Among several other topics, the curriculum of each of our department's three undergraduate programs is discussed. At this stage, not all students are certain about which specific program they would like to pursue; sometimes they even opt to change to programs offered within other departments and schools at the university. For these reasons, the essence of each degree program, including TCET, must be properly explained. One of the TCET

committee members has agreed to include a more in-depth discussion of the TCET program in the departmental orientation course, which he also teaches.

SPSU supports a vigorous outreach to prospective students via an ever-growing distance learning program. Although few TCET-related courses have been converted to a distance learning format, we have decided to use this vehicle as another means to increase program enrollment and visibility. However, at least one TCET-related course (ECET 3810), which is a course in objected-oriented programming that includes lectures about the TCP/IP protocol, sockets, and distributed applications, has been converted and successfully taught online. The TCET committee has begun the process of determining how to offer online courses and which courses should be converted.

A recognized difficulty in teaching online course is the requisite support of laboratory exercises that have significant hardware components, such as configuring a router or switch [10]. Although such configurations can be made remotely, many institutions do not allow the necessary access due to campus network security concerns.

Students can attend laboratory sessions on a few select weekend days, but this can be a disincentive to some would-be distance learners. Simulation programs can often be used to compensate for the need to have hands-on laboratory exercise, but they shouldn't be used as a substitution for all such exercises. The TCET program currently uses several analytical tools and simulators, such as SystemView, MatLab, OPNET, and GNS3, for various exercises and demonstrations, which are being considered for use in online courses. Factors such as licensing implications and VPN access have been discussed, but not fully determined. Although hybrid solutions consisting of hands-on weekend laboratory exercises and the use of analytical tools and simulators are being considered to provide a true learning experience to would-be remote students, several details still need to be resolved.

We are making efforts to expand our extant interface to the telecommunications industry. In addition to our annual meeting with our Industrial Advisory Board (IAB), we have invited speakers from industry-related organizations to provide our students with seminars wherein state-of-the-art technologies and practices are discussed. In this past year, for instance, we invited the owner of a network security firm, a partner of a project management consultancy, and a Cisco network engineer to talk to our classes and answer questions about the industry. The seminars were well attended and generated much interest from our TCET students. Some students from other disciplines attended—sign in was required—and asked for follow up information about the speakers and telecommunications-related topics.

We continue to nurture a connection we have to an organization called Atlanta Telecommunications Professional (ATP), which is comprised of business executives from the telecommunications industry. From funds generated by their annual golf tournament, ATP generously provides funding for academic scholarships to a few of our TCET students; recipients are selected by the TCET committee. Last year ATP asked that we invite the recipients to give a brief talk at their 2010 annual tournament. As such efforts grow it is our desire to provide our students with more opportunities to interface with the administrators and technical experts within their chosen field.



## Conclusion

We believe that we have accurately determined the primary causes for the decline in enrollment of the TCET program, and feel optimistic that the plans that we have put in place, and are beginning to enact, will not only create a positive enrollment growth curve, but will also aid in the improvement and fine-tuning of the program. Not only will our current students benefit from the increased curriculum offerings and job opportunities, but prospective students will be able to more clearly determine if they want this to be their selected major and, hopefully, vocational path.

By focusing on the dissemination to key stakeholders of an accurate definition of “telecommunications” and its contrast to “information technology,” improving our curriculum to ensure that it is accurately aligned with the evolving telecommunications industry, marketing our program in several high-potential markets, and providing our students with the interface to the industry that will enhance their chances of vocational success, we believe that we will see tremendous growth and interest in the TCET program in the years to come.

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### Tom Fallon

The author received his BS and MS degrees in Electrical Engineering from the Georgia Institute of Technology and his Ph.D. degree in Astronomy from Georgia State University. He is an Associate Professor of Electrical and Computer Engineering Technology at Southern Polytechnic State University and is coordinator of the BSTCET program. He has 20 years of industrial experience in telecommunications, conducts networking workshops, and is author of the book *The Internet Today*. His dissertation research at Georgia State University involved the remote operation of the CHARA (Center for High Angular Research Astronomy) telescope array via the Internet.