

Learning the Culture of the Workplace in an Engineering Technology Program

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ABSTRACT

Engineering Technology programs are designed to provide students with the technical skills and critical thinking abilities to become successful professionals. In today's evolving market, the success of our graduates will depend on their ability to solve not only the current problems of their field, but to anticipate their future needs. Employers demand professionals with broad knowledge, not limited to technical issues. If a few years ago the basic mission of the graduates from Engineering Technology programs was the repairing and maintenance of equipment, today their role has evolved into being involved in technology management. These requirements from industry reflect in academia, as the survival of Engineering Technology programs is closely related to producing graduates that can satisfy what is required from industry.

This paper presents approaches to bring industry closer to the students. The main goal of these activities is to teach the students the culture of the workplace. We want to address issues such as the importance of professionalism, the importance of writing, the need for communication with other professionals, etc., beyond the merely technical contents that are the basis for their future careers. This knowledge makes them to become more successful in their professional careers.

INTRODUCTION

A common goal of Engineering Technology programs is to produce highly qualified and skilled graduates to serve industry and the society. These programs need to provide students with the vast range of expertise that will be required in their professional careers. Industry demands for graduates in Engineering Technology are twofold. First, they require their future employees to have a good technical knowledge to carry the specialized job that they are responsible for. As graduates from recognized institutions have received extensive training in technical aspects, this first requirement is normally successfully completed by their formal education. In second place, industry demands an increasingly strong sense of professionalism and knowledge that goes beyond the merely technical skills from the graduates that they employ. They demand, in addition to the technical skills, work experience, team work and especially outstanding communication skills as they prove to be critical in the work environment (Xu et al., 1997). As

the responsibilities of technologists move from the traditional roles of maintaining and repairing equipment to become managers of instrumental resources, graduates need to have a global knowledge of their profession.

In this continuous evolving scenario, it is necessary to prepare future professionals for the current demands of their industry as well as to anticipate what will be required in the upcoming years. Education in Engineering Technology has to address these challenges and the dynamics of a strongly competitive and global market, without sacrificing the knowledge of technical skills as it has been done in the past. In this context, it is imperative that students are familiar with all these considerations in order to make an easy transition from college to the workplace. This paper describes the efforts and activities to introduce the culture of the workplace at Penn State, Wilkes-Barre Campus. Although these activities are mainly oriented towards the Biomedical Engineering Technology (BET) program, they can be easily adapted to suit the needs of other programs in Engineering Technology.

ATIVITIES TO UNDERSTAND AND LEARN THE CULTURE OF THE WORKPLACE

The academic responsibilities of Engineering Technology programs reside with instructors that combine their knowledge with their industrial experience to provide the required breadth of perspective for the students. However, it is very difficult, if not impossible, to cover all areas with the detail that is needed in industry today. It is recognized that the students benefit from being exposed to opinions coming from different areas (Steiner, 1998). In the BET program, the student contact with industry has been achieved through a series of different activities that are described in the following paragraphs.

The first contact of BET students with industry occurs through the Guest Lecture Program. In this program, professionals from the different areas of Clinical Engineering present specific issues in their fields of expertise, either by traveling to campus or by interactive video conferencing. These speeches are well balanced between those with high technical content and those that are aimed to increase the student's breadth of perspective in the field. These last series of lectures focus on issues that have been traditionally forgotten in academia, but that will have a strong impact in the student's professional careers (Lozano-Nieto, 1997). These lectures are extremely important as their success as future professionals will depend not only on their technical skills, but also on other social and interpersonal skills, mental characteristics as well as their values and attitudes (Newport and Elms, 1997).

The use of the Internet and in particular the World Wide Web (WWW) also contributes to help the students to understand the industry where they will work in the future. The students in the BET program are required to analyze the market characteristics of different systems of medical equipment, where the WWW becomes an invaluable resource. As more manufacturers, vendors and distributors of equipment distribute information about their products through the WWW, the students are able to access this information that otherwise is sometimes difficult for them to obtain (Zimmerman et al., 1998). This allows them to have a clear idea about the latest technology in a particular in clinical engineering and the market share between manufacturers.

Field trips to hospitals have always a positive impact on students, as they visualize a real work setting and understand how clinical engineers interact with other health-care professionals. Students have the chance to observe the equipment that clinical engineers are responsible for, from the most common and simple ones to the newly purchased and sophisticated equipment. The description by the manager of the clinical engineering department of the technician's responsibilities is used as a reference during classes, giving rise to invaluable examples. These trips are priceless to increase the interest of the students in the field and help them to understand the complexity of the workplace.

An internship in industry is, without doubt, an extremely positive learning experience for the students involved in it. Students enrolled in the BET program at Penn State need to take a 400-hour internship in a hospital before they graduate. In the hospital, they have the opportunity to work with the equipment that is not available in the university laboratories. They are rotated through the different services in the hospital, what contributes to round their education. What is also important is that during this time, the students have the opportunity to work very closely with different professionals, learning not only the technical aspects of their job, but also the interaction between different groups. During the internship, the students are assigned different task, starting with basic preventive maintenance and safety checks to gradually being exposed to more complex and challenging tasks. These activities boost the student's self-confidence in their ability to act as professionals at the same time that provides them with work experience before graduation that is greatly valued by future employers. Interacting with different professionals with different goals and responsibilities, the students can decide in which particular field within clinical engineering they want to pursue their careers. Finally, as they have to interact with other technicians, the students learn the state of the job market in a specific field or geographical area, as well as standard salaries and other benefits, placing them into a privileged position at the time of negotiating compensation packages with their future employers

SELF-ASSESSMENT

Any new activity that is introduced into an academic program should be assessed to measure and determine how it affects the learning process for the students, as well as to detect possible drawbacks. Also, a self-evaluation for the academic program with a strong input from industry allows changing the curricular contents as needed, thus contributing to produce highly qualified professionals with a global understanding of industry needs. It is not the objective of this paper to discuss the assessment tools used to analyze the impact of this approach into the learning process for the students or the outcome of the assessment. However, it is necessary to mention that these tools include surveys given to the students regarding the effectiveness of the Guest Lecture Program, the comparison of surveys given to the students before and after the internship is completed, the daily logs that the students have to fill in during their internship period, and the interviews with their clinical supervisors. The contact with students after graduation can also help to measure the quality of an academic program, focusing especially in the number of job interviews and offers and the compensation in their first job.

CONCLUSION

This paper has shown the need to incorporate non-traditional academic activities into an Engineering Technology program aimed to help the students become more familiar with a typical workplace setting, and at the same time increase their professionalism (Cooley et al., 1991). As technology and industry are continuously changing as well as the roles and responsibilities for the graduates, the academic programs to produce professionals in the field cannot become static. The activities described in this paper, although focused in a BET program, can be easily adapted to any other Engineering Technology program. They are based on presenting the BET curriculum not like a series of different courses that the students need to complete in order to graduate, but a whole set of knowledge that shares a common idea. In this way, the students are introduced to their future profession since their first contact with college. This approach puts additional work load in the faculty, as we need to create new ways of instruction delivery, we need to plan and coordinate all these activities and speakers, and more important, we need to convince the students that this will benefit them in their professional careers. However, the positive results obtained in the BET program clearly counterbalance the possible inconveniences of the additional workload. By shifting some of the academic activities from a teacher-centered approach to a learner-centered approach, the students can observe the reality of the profession at an early stage and consequently become more interested and involved in the academic program, thus helping us to produce better professionals.

REFERENCES

- Cooley W, Klikhachorn P, McConnel R and Middleton N, 1991. Developing professionalism in the Electrical Engineering Classroom, *IEEE Transactions on Education*, vol 34, pp. 149-154.
- Lozano-Nieto, A, 1997. Student perception on the use of interactive video conferencing in Biomedical Engineering Technology education. *Proceedings of the 1997 ASEE Conference*, session #1149
- Newport C and Elms, D, 1997. Effective Engineers. *International Journal of Engineering Education*, vol 13, pp. 325-332.
- Steiner C., 1998. Education for innovation and management: The engineering educator's dilemma. *IEEE Transactions on Education*, vol 41, pp. 1-7
- Xu Y, Wald A and Cappiello J, 1997. Effective communication in the biomedical engineering department. *Journal of Clinical Engineering*, Vol 22, pp.328-334
- Zimmerman D, Palmquist M and Muraki M, 1998. Students as WWW Surfers: A brief look at students and the WWW. *Proceedings of the 1998 Int. Professional Comm. Conf.*, pp. 285-232

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