

Internship Experiences in Biomedical Engineering Technology: An Overview of Students and Prospective Employers Perceptions

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ABSTRACT

Students pursuing an Associates Degree in Biomedical Engineering Technology at Penn State University are required to complete a 400-hour internship in an approved health care facility before graduation. This paper analyzes how the students perceive the need to be involved in the internship, including its effect on their professional development as well as on their ability to perform the tasks associated with their responsibilities. The students were asked to describe and summarize their experiences in the workplace in a daily log, to write a formal report describing in detail a project that they undertook and provide a comprehensive description of their experience. The effect of working in a Clinical Engineering department before graduation strongly increased the students' confidence in their strengths and made them aware of those items that required further attention and development. A very positive outcome from the cooperative experience was the full employment of all the students involved in the program, in the places where they carried out their internships or through contacts developed at that time. The paper also analyzes the results of a survey given to the students' supervisors. They were asked to describe and evaluate the qualities most needed in entry level biomedical engineering technicians, and how these qualities changed during the internship period for the students that they supervised. All the clinical engineering supervisors stressed the positive effects of the internship experience in creating qualified professionals in the field at the service of the society.

INTRODUCTION

In today's competitive market, in particular in Engineering and Engineering Technology, actual industry experience is greatly appreciated not only by future employers, but also by the students. Employers feel more comfortable with future employees that have some experience before graduating from college, and have acquired a basic knowledge on how their specific industry works (Lessard, 1996). Students recognize that the lectures and laboratory experiences delivered while in college are necessary to learn the basic and theoretical principles for a given subject. However, they also recognize that due to the limitations of the campus infrastructure, they cannot reproduce as much as would be desirable, the actual industry settings. This is especially true in Biomedical Engineering Technology, as the teaching laboratories on campus cannot have large pieces of medical equipment such as X-Rays, Magnetic Resonance Imaging (MRI), Operating Rooms, etc., for the students to develop their skills on their repair and maintenance.

The more information the students have about the industry in their specific field, the higher their confidence will be and consequently they will be more successful in their first years in industry (Zambuto, 1997). The goal of the academic programs in Engineering Technology should be two-fold: to teach the students the theoretical and practical principles in their future professions and to give them an insightful vision of the industry in which they will develop their careers. While the first goal has traditionally been well addressed and solved, the second one is not addressed by all institutions for all Engineering Technology programs. This paper presents the findings of the cooperative experience in the Biomedical Engineering Technology (BET) program at Penn State University, Wilkes-Barre Campus (PSU-WB), although the author firmly believes that they can be extrapolated to any Engineering Technology program that incorporates this kind of learning experience.

THE CLINICAL INTERNSHIP

During the summer of their sophomore year, after completing all other coursework, the students enrolled in the Associate Degree in Biomedical Engineering Technology (BET) at the Penn State University, Wilkes-Barre Campus (PSU-WB) are required to take a clinical internship at an approved hospital. The objective of this internship is to have the students exposed to situations and equipment that they will encounter in their professional careers. The clinical internship is carried out for not less than 400 hours, with the students rotated as much as possible among the different services in the hospital, increasing their exposure to different medical equipment.

The grade that the students receive for this course is mostly based on the evaluation provided by their clinical engineering supervisor, but also considering the instructor's criteria about the equipment they worked on, and the problems that they had to solve daily in the hospital. It also considers a daily log in which the students are required to make an entry every day during their internship period what makes them to evaluate their activities in a day to day basis (Wright et al., 1997). The daily log is more than an evaluation tool: it gives a very insightful vision to the faculty member in charge of the BET program about difficulties that the students find in their first days or weeks in the workplace. With this knowledge, it is then possible to modify the curricular contents to address these issues before the students start their internship. The students that participated in the Clinical Internship for the Biomedical Engineering Technology program in Summer 1997 were asked to respond to a survey before it started and after it was completed. This paper presents the analysis of the student responses considering also the additional input from their daily logs as well as the answers in a survey given to their clinical engineering supervisors.

RESULTS

All the students evaluated their internship as a very positive experience, not only because it improved their technical skills, but also for the opportunity to interact with other hospital staff. They recognized that this experience gave them a clear vision about one of their future workplaces, it served to identify the strengths that they had after completing their regular courses, and to detect the weaknesses that needed to be addressed before successfully applying for a job. It is unquestionable that the strongest benefit from this kind of cooperation is that the students acquire real experience before graduation. Therefore, this experience is an additional asset to their future employers.

But not only the students benefit from an internship experience in Industry. As a faculty member that supervised the students' performance during their clinical internship, the author interacted with the students and their clinical supervisors on a continuous basis. This interaction undoubtedly benefits the BET program at PSU-WB, as the faculty keep closely in touch with industry trends, new types of medical equipment and factors that affect the profession and might affect the future graduates. With this information, it is very easy to continuously make small changes in the curricular contents of the program to keep it adequate to the needs of industry, which is essential for the success of any Engineering Technology program.

All the clinical engineering supervisors for the BET students during their internships were also contacted and interviewed by the author regularly, and asked to respond to a survey on issues regarding the effects of the internship on the students. All of them agreed that a key benefit for the students was their exposure to large pieces of medical equipment that because of their physical size and economic cost cannot be used in the Campus laboratories. To learn about this kind of equipment, such as X-Ray machines, MRI imaging systems, etc., that are an important part of the hospital infrastructure, the students need to work on them in the hospitals, under the supervision of a qualified technician. The supervisors also agreed that in their internship period the students were able to realize how industry works, what are the major concerns and problems that the clinical profession experiences today, and what the students will be expected to accomplish in their first jobs. Finally, they pointed out that at the beginning of the internship period, the students were not confident in their abilities to work on different pieces of medical equipment. This lack of confidence, however, was solved during the internship because the students had the theoretical background and hands-on experience to be satisfactorily involved in the different projects that they were assigned to work on. This can be identified as one of the greatest advantages of exposing students to internships or cooperative experiences with industry especially important in Engineering Technology programs.

But this is not the only benefit that faculty members involved in the supervision of an internship or cooperative program obtain from these activities. The students daily logs can be used to detect some of the difficulties that they experienced in the first weeks of internship, not based on their technical skills, but on other issues such as relationships with other engineers and technicians, problems with self-confidence, supervision, etc. These problems are not infrequent, and are especially important in those students without experience in industry. However, it is important that they are seriously considered as the profession is currently evolving from maintenance to managing of health-care systems (Keil, 1997). The faculty involved in Engineering Technology programs are concerned about student performance in their first years of experience, but sometimes it is difficult to assess the real problems that recent graduates face after starting their new jobs. In order to prepare well-qualified and responsible professionals, these issues should be discussed in the classroom, to provide the students with an insightful idea about what they can expect in their workplaces, how to prevent conflicts, how to interact with other professionals, etc. By shifting the occurrence of these problems into their academic years, the students feel less pressure. Also, they are exposed to industry experience as part of their integral formation, making them become more competitive at the time that they apply for a position.

CONCLUSION AND DISCUSSION

The students involved in a Clinical Internship in the BET program at PSU-WB, and their clinical engineering supervisors recognized the important benefits of this kind of cooperative experience. Also, the students that collaborate with industry while in college have generally more job offers after graduation than those students not involved in such programs. After the internship is completed, the students bring more than 400 hours of experience to their prospective employers, not only in the technical issues, but also in issues related to the culture in the workplace, making this experience a very valuable asset. Also, during the internship the students had the opportunity to interact with different professionals from different institutions, companies and services. This networking before graduation becomes very useful, as many of the new hirings and job offers in the Biomedical Engineering Technology profession are done through personal contacts rather than blind advertisements. If the hospital where a student is doing an internship has an entry level position, this student will be closely watched by the supervisors, gathering much information that can be assessed through a typical employment interview. Even if that particular hospital does not have an entry level opening at that time, the supervisor can lead the student towards institutions that they know are in the position to make such offers, and recommend them to the other supervisors.

During their internship period, students have to interact with other health-care professionals such as vendors of medical equipment, technicians from a manufacturer or from independent companies, supply providers, etc., that are aware of current job openings at their own companies. Furthermore, interacting with all these different professionals, the students can decide the industry in their particular field in which they want to pursue a career. Most of the students that graduated from the BET program of the PSU-WB Campus in Summer of 1997, obtained their first jobs through contacts provided by their internship supervisor in the same hospital or by contacts with other hospitals and manufacturers of medical equipment. The interaction with the other technicians in the hospital gave the students a good knowledge about salaries and other benefits common in that area or type of industry that put them in a very privileged position at the time of negotiating the compensation package with their future employers.

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