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From Entry to Employment: Interlocking Keys to Building a Successful Technician Program

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From Entry to Employment—Interlocking keys to building a successful technician program

With support from a National Science Foundation Advanced Technological Education (ATE) grant (Grant #1400433), and with significant industry support, Community College of Philadelphia has developed and implemented a successful program to address the need for Biomedical Equipment Technicians (BMETs) in the field of Healthcare Technology Management (HTM). We have measured success in terms of student recruitment, retention and job placement.

While we have defined success in terms of student recruitment, retention and job placement, it is our contention that success is best achieved considering these areas as indicators of an overall process of program design and implementation where there is clear alignments between industry engagement and employment opportunities, program contents and structure, and targeted strategies for marketing, recruitment and retention. That is, the program should be planned systematically as an integrated whole.

BMETs (also referred to as Medical Equipment Repairers) work in hospitals and other healthcare settings to help ensure the safe operation of medical devices, such as defibrillators, ventilators, infusion pumps, patient monitors, and other critical equipment [1]. In addition to a full understanding of the operation of a wide range of medical devices and specialized test equipment and procedures, BMETs must also have an understanding of issues specific to the hospital environment, such as infection control. Further, hospitals have become highly networked environments, where interoperability and network security have become critical issues, as hospitals implement electronic medical records [2].

BMETs are part of the larger Healthcare Technology Management (HTM) field that also includes involvement in hospital safety issues, equipment acquisition, improvement of patient outcomes, and control of equipment related costs [3].

The day-to-day activities of a BMET typically include both preventive and corrective maintenance activities. This often involves responding to calls from clinical staff such as nurses, respiratory therapists, doctors, clinical lab specialists, and others who are facing a challenge with a piece of equipment they are trying to use. Typical problems include issues such as batteries, internal equipment mechanics or electronics, network connectivity, interface between the patient and the equipment, and errors on the part of the user. BMETs are problem-solvers who need to have the technical knowledge and skills to address a wide variety of problems, as well as the ability to communicate and work closely with both clinical staff, such as nurses and respiratory therapists, as well as IT professionals and a range of other key players in in hospital environment.

The program itself consists of two stackable certificates leading to an associate's degree.

The level-1 certificate is intended to provide students with sufficient background to be hired as entry level BMETs. Students gain knowledge and hands-on skills to enable them to carry out basic inspection and preventive maintenance of a range of commonly used medical devices, as well as knowledge of typical safety and documentation procedures. Students also have coursework in anatomy and physiology and basic electric circuits. A 200-hour internship experience is also included. The level-1 certificate can be completed in one year.

A primary goal of the level-1 certificate is to provide students with the foundation to carry out the work of entry-level BMETs. However, we do not consider it sufficient to be a fully functioning BMET operating above the entry level. Upon completion of the level-1 certificate students may begin the level-2 certificate.

The level 2-certificate is intended to give students greater depth of knowledge in the theory of operation of a number of medical devices to enable troubleshooting of equipment problems above the most basic, as well as to expose students to more complex equipment and testing procedures such as ventilators and electrosurgical units. In addition, students receive coursework in network technology, digital and semiconductor circuits, and a specialized course in medical device networking. The level-2 certificate includes an additional 200-hour internship, and can be completed in one year.

All credits earned toward the 2 certificates may be applied toward an associate's degree. Upon completion of 7 additional courses (including all College general education requirements and a basic Physics and basic Chemistry course) the student will fulfill degree requirements for an associate of applied science degree in Applied Science and Engineering Technology (ASET).

Results

At this point, we have started our third cohort of the level-1 certificate, and are in the first year of running our level-2 certificate. With a capacity of 24 in each class, we filled to capacity the last two of the three years, actually turning away some students after reaching capacity.

While the Associate's Degree has typically been a requirement for entry-level BMETs, a high percentage of our students have found employment in the field with the level-1 certificate.

Program completion and employment data is shown in the table below. Note that the number of students who complete level-1 and who enroll in level-2 is somewhat variable, as we have students who began in one cohort later return to complete necessary coursework with another cohort.

			Of those who completed Level-1	
	n	Completed Level 1	Enrolled in Level 2	Working in the field
Cohort 1 (Fall 2015)	20	65%	67%	62%
Cohort 2 (Fall 2016)	24	75%	61%	56%
Cohort 3 (Fall 2017)	24	75%*	NA	NA

*On track to complete summer 2018

Another indicator that we are on track with our program is the positive perception of students as they complete their internships. Internship site supervisors, those who work in the hospital departments where our students perform their internships, and who work with the interns on a day-to-day basis, answered in the affirmative over 90% of the time when asked if they considered the interns they worked with qualified to be hired as entry level BMETs. In general, the internship provides us with built-in industry feedback each year.

Discussion

Our contention is that the level of success we have thus far achieved is the result of approaching all elements of program development and implementation from a systematic perspective. We will begin by looking at these elements through the lens of student retention.

Will students stay in the program to completion? Many students face challenges to staying in school. These challenges may be external to school, such as family issues and financial pressures. Others may be academic or time management issues. One way to think about retention is whether students are willing to make the sacrifices necessary in order to stay in the program. Or, stated another way, are there enough positive motivators to make it worth putting up with the challenges?

There are a number of reasons students may decide that the sacrifices are worth it. We will look at these reasons in the overall context of program design, program marketing, student recruitment, program structure, inclusiveness, sense of belonging, support, connection to industry and long term goals.

Alignment of Student and Program Goals

Our program is geared toward employment as engineering technicians in the healthcare industry. For students looking for direct patient care or an engineering degree, this is not a good alignment. If employment is what the student is looking for, there must be clear and consistent indications to students that employment is indeed a likely outcome.

The foundation for this begins with industry engagement [4][5]. Obviously we wouldn't want to start a workforce-oriented program, or keep an existing program going, if there wasn't an employment need. But having industry engaged throughout the program let's students know, and reinforces the message, that industry is interested in the program, and by extension, in them.

In our program industry is involved in ways that are highly visible to the students. Our BMET courses are taught by people currently active in the field. Others have come in to class as guest speakers or to assist with labs. Students are made aware that a good deal of the equipment they work with in lab has been donated by an industry partner. And, of course, industry has enthusiastically supported the internship program. Through these ways of engagement there is an ongoing message to students that not only are there job openings but completion of the program is a ticket to those openings.

Program Structure

If the barriers to program completion are too high, students will decide that the sacrifice is not worth it, because the challenges of completion are too high. We have addressed this through the creation of a certificate structure. After completion of the first level certificate, students are in a good position to be hired as biomedical equipment technicians, even though the traditional entry level degree in the field has been the associate's degree.

An entry level certificate will not work in all situations. Prior to the start of the program we established that there is a growing need for entry level BMETs on both national and regional levels. Discussion with local industry representatives highlighted the challenges of filling positions made available through impending retirements and overall growth. At the same time there was no existing educational program in the region to address the issue. Employers were having a very hard time finding candidates to fill these positions, and as a result were identifying promising candidates who they would have to train on all aspects of the field. On-the-job-training, however, was not providing the depth of knowledge employers were looking for—especially as people with many years of experience were leaving through retirement. Under these conditions, it made sense to have a pool of potential employees who had a good foundation and the option to go further with their schooling.

From the student perspective, by offering a level-1 certificate that has a strong potential to lead to work, it lowers the initial threshold of challenge—a 1-year program sounds very do-able, whereas a 2-year program may not seem within reach. The decision to select a short-term certificate rather than a degree program may be based on a number of different factors, such a prior academic experience and the need to quickly enter the workforce. There is some evidence that certificate programs may be more attractive to first-generation college students [6]. Whatever the initial attraction of a one-year program might have been, once students have successfully completed the first year program, they 1) may be working and therefore have reduced financial challenges; 2) May have a clearer picture of how the level-2 certificate and the Associate's Degree would benefit them, giving greater motivation to complete level-2; and 3) If they lacked confidence in their ability to be successful and have seen success, or if they have realized they are able to juggle school with the rest of their lives, it increases their belief in success, which will increase retention as well.

In other words, the program structure aligns with both industry and student needs.

Achieving a Good Fit

Of course none if this will mean very much if the student is not a good fit for the program or the profession. And how good a fit the student is for the program goes back to how the program is marketed and how students are recruited into the program.

How we market the program has a big impact on the students we will attract. First and foremost, we should market the program consistent with the needs of the workplace. Marketing material should give a good sense of what the job is about, and why it's important. Students who resonate with that message are the students we want in our program. And those are the students the employers will want to hire.

Recruitment strategies go hand in hand with marketing. Marketing gets the message out, but recruitment allows you to make connections directly with potential students and with those who might influence potential students. Recruitment activities should provide a message consistent with marketing, with the added piece of making personal connections, building networks, and getting students signed up.

We have run information sessions where we provide a hands-on activity that is related to the type of work someone in the field might do, providing students with a concrete experience related directly to the workplace. That will either excite or turn off potential students. Both outcomes are positive. For someone who is turned off, they aren't a good match and it is better for the student and for the program to find that out sooner rather than later. A student poorly matched to the program will eventually be turned off and leave, having taken the space of someone who might be truly interested, and wasting your time and theirs.

Our primary target audience at our information session has been existing college students who may not be completely settled on their direction. We have a large population of students who want to pursue a career in health care, but come in being only aware of nursing as an option. But many do not really know what nursing is truly about. Nursing and other direct care allied health roles are great for students who truly want direct patient contact, but for those interested in healthcare but maybe less interested in a direct care role, we have found a number who are interested in the technical side of medical equipment and they have found a good home with us.

Marketing and recruitment strategies also provide an opportunity to encourage students who are from groups typically underrepresented in the profession to let them know that it is a profession they can excel in. Our college has significant racial and ethnic diversity, and that diversity is well represented in our program. However, this is a field where women are significantly underrepresented. Even though a majority of students at the college are women, women do not sign up for the program in the same number as men.

Thus we have used recommended marketing and recruitment strategies [7] to reach out to women, and we have seen a clear increase in women involved in the program.

Some of our marketing material is specifically directed toward women, and we have run successful women-only information sessions. As a result, we have increased the number of women in the program, with the 3rd cohort starting with 25% women (in a field estimated to be around 10% women [8]).

Recruitment is the Start of Retention

In addition to helping ensure a good match for the program, recruitment efforts also help to establish a relationship with future students. We have seen that many of our students face challenges in navigating the College's bureaucracy, which can indeed be daunting. Helping students navigate admissions and registration issues can be a make-or-break for many students. And unfortunately when students get guidance from other offices, it is not uniformly accurate. So as part of our efforts we reach out to the Counseling and Advising Offices on a regular basis.

But in general we want students to keep their focus on the program and to come to us to ensure the most up to date information about the program.

Retention efforts include not just keeping students on track. We also ask instructors to monitor student progress in relation to both academics and non-technical work-related skills, such as communications, being on time, completing work, etc. And then we follow up with students regarding any issues we see that arise.

The Classroom is Key

What happens day to day in the classroom is key. It is the most consistent ongoing contact we have with students. Having industry experts in the classroom has great advantages. It ensures that students are learning the most up to date information available. As noted above it reinforces the value that industry places on the program and on the students in the program, and also sets the tone for the professional behaviors and motivation for working in the field.

But there are also challenges associated with having industry-based instructors who may not have much experience with teaching and may not be familiar with college policies and procedures. We thus developed a mentoring program for instructors to help address some of these concerns. The program is intended to be a support to new instructors to ensure they are introduced to the College on-line systems and to support their pedagogy as well. It has made for a more positive experience for both instructors and their students alike.

Conclusion

Systematic planning that considerers all aspects of the program as a single system, has allowed us to gain success in student recruitment, retention and job placement. Industry involvement in the program has helped to create a program with content and structure that fulfills industry needs and supports student success. Student success in the program is reflected in the high level of job placement we have seen.

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