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Creating a Mock Environment for the Real World

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College programs have many needs and often minimal funding. The purpose of this collaborative project was to creatively meet the needs of the St Cloud Technical and Community College's biomedical equipment technology students' hands-on learning experience and at the same time the maintenance of equipment in the St Cloud State University Nursing Department and St Cloud Technical and Community College Clinical Departments. This working collaborative established between the 2 schools resulted in a win-win situation for all. Biomedical equipment technology students repaired equipment and created an inventory while providing real-time customer service, and the nursing/clinical departments appreciated quick and consistent repair of broken and defective equipment.

College programs have many needs and often minimal funding. The purpose of this interdisciplinary collaboration was to creatively meet the needs of St Cloud Technical and Community College's (SCTCC's) biomedical equipment technology (BMET) students' hands-on learning experience. With the additional purpose of fulfilling the maintenance needs of clinical equipment located in the St Cloud State University (SCSU) Nursing Department and SCTCC clinical departments. Broken equipment, regular maintenance, and customer interactions prepare BMET students for work beyond the classroom setting. The collaboration established between the programs resulted in a win-win situation for all involved. The BMET students performed required maintenance, repaired equipment, and created an inventory while providing real-time customer service to various clinical departments. Nursing and clinical sites at both SCTCC and SCSU benefitted from well-maintained and repaired equipment.

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Who Are We?

SCTCC History

Biomedical equipment technology is defined in several ways. The SCTCC program adheres to the following description.

Healthcare technology management is the name of the field responsible for managing the selection, maintenance, and safe and effective use of medical equipment and systems. This field includes biomedical equipment technicians, clinical engineers, imaging equipment specialists, laboratory equipment specialists, and others who protect patient safety and reduce healthcare costs related to technology.[1]

The SCTCC BMET program was created through a partnership with St Cloud Hospital's clinical engineering department. The department leader worked with the energy and electronic program director at SCTCC, to build the BMET program from scratch and align it with the competencies put forth by the Association for the Advancement of Medical Instrumentation Core Competencies.

St Cloud Technical and Community College was founded in 1948 as Minnesota's second technical college. While SCTCC has offered liberal arts and sciences courses for years, in 2010 the college became a comprehensive technical and community college offering the associate in arts degree in addition to technical programs.

Within a year of program completion, 97.5% of our graduates are employed within their fields of study or successfully transfer to continue their educational goals. We currently accept 12 biomedical students annually. The biomedical program consists of a total of 4 semesters (60 credit hours) of theory and laboratory experiences.

SCSU Nursing Department History

The Department of Nursing Science in the School of Health and Human Services on the SCSU campus, began admitting students in a traditional program beginning spring semester of 2002. The program is approved by the Minnesota Board of Nursing and was accredited by the Commission on Collegiate Nursing Education May 20, 2004, with the mission of educating caring nursing professionals who are committed to excellence and willing to serve the health needs of diverse communities throughout Minnesota and the region.

The B.S. degree with a major in Nursing prepares caring professional clinicians equipped to practice in contemporary healthcare settings. An emphasis is placed on basic holistic nursing concepts and skills, wellness promotion, advocacy, proficiency for effecting and improving the healthcare system, and the capability to address the changing needs of clients, families, and communities. Currently, 50 students are admitted twice a year. The nursing program consists of a total of 5 semesters of theory and clinical laboratory experiences.

Why Did We Do This?

The BMET program had a need to get out of the classroom and work in as close to a real world setting as possible. Part of the educational experience is to have students interact with other healthcare professionals, which in our case included the SCSU Nursing Department and various clinical faculty at SCTCC. The BMET students also had a need to get exposure to a wider variety and assorted models of medical equipment. This collaboration has enabled biomedical equipment technicians in training to encounter newer technologies as well as interact with other healthcare disciplines to maximize their experience and build the skills necessary for entrance into the field and beyond.

At the same time, the SCSU Nursing Department had a need for repair and maintenance of medical equipment and a complete inventory. Over time, broken and malfunctioning equipment had accumulated. With no budget for replacement or repair in sight, the laboratory coordinator had to consider other options and creative approaches to remedy the situation and maintain the operational aspects of the laboratory. Based on previous experience with biomedical technicians in the hospital setting, the laboratory coordinator decided to check out the local community/technical college to see if there was such a program.

Initial Conversation/Steps

After the nursing laboratory coordinator at SCSU verified that a biomedical program existed at SCTCC, initial contacts were made, and discussions ensued. The SCTCC program director at that time was more than willing and excited to participate in a newly formed collaboration, which would be beneficial to both schools. The process started with the nursing laboratory coordinator and the BMET program director consulting with administration concerning safety and policies. After receiving approval to move forward, plans were made to begin working on the project. During this time, there were some faculty changes, so the program was delayed about a year. The nursing laboratory coordinator contacted the new biomedical equipment technician faculty/program director and explained the idea. She was on board and shared the anticipation of meeting mutual needs. The program director and concept were resurrected and took off, serving both programs quite well.

The next step was to begin scheduling time in the SCSU nursing laboratory, which is often a challenge for collaborative work. We share limited space with various classes and multiple students. The BMET students work around and within nursing laboratories, simulations, and testing as these spaces are shared, and all students enjoy the benefit of an accurate mock environment. The BMET students have been willing to volunteer their time to come in outside regular class time to complete time-sensitive tasks.

What Were Our Goals?

Our collaborative planning included discussing mutual needs, scheduling laboratory times, student assignments, and most importantly setting individual and combined goals. The goals would provide direction and focus for our work during the academic year.

- BMET goals
  - Maximizing full use and potential of all equipment
  - Gaining exposure to current technology and high order trouble shooting
  - Repairing and maintaining campus equipment at both schools
- Nursing goals
  - Maximizing return on equipment investment
  - Optimizing equipment function and availability
- Combined goals
  - Establishing a collaborative relationship between the 2 schools[2]
  - Developing practical learning experiences and in-service training that are mutually beneficial[3]
  - Developing mutual understanding about nursing and BMET
  - Creating a complete inventory of all nursing equipment
  - Expanding faculty knowledge of disciplines
  - Increasing students' exposure to device types, manufacturers, models, and mock clinical environments

- Providing exceptional customer service[4]
- Enhancing student training through experiential learning[5]

These goals reflected our collective belief that all healthcare customers will benefit from collaborative interdepartmental alliances. This was demonstrated when the first BMET graduating class to participate in the collaborative project reported that the experience helped them learn effective communication and become familiar with healthcare environments. The class also reported that they appreciated the exposure to a variety of equipment and learning opportunities that pushed students out of their comfort zone. All agreed that the experience was beneficial and that it should continue and evolve.

As a result of shared feedback and in preparation for the next class of biomedical students, a conceptual framework was created. This framework maps out the collaborative vision for the project and represents the objectives, successes, and lessons learned during this ongoing partnership (Appendix A).

Experiential Learning

It is not a secret that mock environments enhance textbook and classroom learning. The biomedical students needed to get beyond the classroom setting to make their work realistic and to see how their work affects patients and staff in healthcare settings. These students will have various career paths ahead; however, all are certain to use the experiences that they encountered to solve problems using a collaborative mindset. Experiential learning has also helped students to build confidence and hone their communication and customer service skills. Both the nursing laboratory coordinator and BMET program director worked together to create a robust curriculum that addressed BMET student assignments and provided repair and cost savings for both the SCSU nursing laboratory and the SCTCC clinical equipment. This includes the following:

- Repairs and equipment checks
  - Nursing: vital sign monitors, infusion pumps patient beds and lifts, mannequin issues
  - Other: dental and operating room equipment, microscopes, sterilizers, and ventilators
- Major projects
  - Planning and installation of a patient monitoring network
  - Built a complete inventory of all supported departments
  - Created a live air/O_2 and suction system
  - Developed a repair request process
  - Implemented a system to prolong battery life of equipment
- Interprofessional communication demonstration
  - Worked directly with customers to determine work order details and departmental needs
  - Created clinical equipment instruction videos/presentations
  - Created and presented a PowerPoint highlighting the yearlong collaboration to SCSU and SCTCC faculty and administration

In addition to the assignments listed above, the BMET students participated in an end-of-life scenario that incorporated multicultural considerations that gave them a unique understanding of the nursing profession as well other factors that impact the nurses in the field. Some of the students also volunteered to participate in "on-call" simulations. For example, the faculty who used a ventilator for their simulation had several issues in the past years with alarms and malfunctions during the simulation. She asked that the biomedical students attend the simulation at SCSU in case any ventilator issues arose. The BMET volunteers spent the day observing nursing students at SCSU in a mock environment. They were able to witness how nurses were expected to interact with family members and, as a bonus, were able to ensure that the vent was working properly throughout the simulation.

Although the role of BMET professionals is safety first and foremost, communication is key to not only safety, but also to a successful collaboration! Communication has paved the way for the success that has been enjoyed by this collaboration. A challenge of the collaborative project involved biomedical students learning to speak to clinical audiences using medical terminology. Although the BMET students are most comfortable speaking in technical terms, they needed to understand and communicate with their customers in medical and laymen's terms. The students are encouraged to listen to their customers and then use the customers' language to work through the issue at hand.

The importance of communication as well as customer service and professionalism is incorporated into the curriculum in all BMET-focused courses. Students discussed how communication impacts customer service and professionalism. We discuss what exceptional customer service looks like as well as experiences that we have all had as customers. Students learned about and practiced email etiquette. We also focused on how body language and other nonverbal communication can impact the customer experience. Students were assigned specific departments and contacts for each department. Those contacts became the student's customers and gave each student the opportunity to practice what he/she had learned in the classroom related to patients and customer service. The students were assigned different departments and customers during their final semester. In addition, they were given an assignment to build a customer satisfaction survey that they then distributed to each of their

respective department contacts. Ultimately, the survey was modified and distributed just before graduation to the customer of their choice.

Professionalism

The biomedical instructor insisted on professionalism from every student during every encounter. She encouraged a leadership mentality from each student. An assessment tool (Appendix B) was created to ensure consistent professional behaviors including accountability, appearance, attitude, attendance, and ambition as part of each student's daily assessment.

Kai[6] recently published "A Vision for HTM Leadership" for Association for the Advancement of Medical Instrumentation's blog. He wrote, "Some of the key qualities for a leader are being passionate, having a commitment to improvement, and the ability to communicate as well as build meaningful partnerships. Newcomers to the field can have such attributes. They can be effective leaders with a purpose, plan, and goals. They can dream up what the future can be and what our profession can become. They can help reengineer technical processes that can affect clinical operations and impact patients and staff."[6]

An important idea that the BMET program director brought into this collaboration was the hope that if BMET students could improve communication and educate nursing faculty and students about the role of biomedical equipment technicians in healthcare environments, we could fix the "broke" problem. Most nurses, as well as the general population, do not know about the biomedical profession until they run into an issue with a piece of equipment. Technicians in the field often find equipment with notes reading "broke" on them. This unfortunately does not help biomedical equipment technicians with troubleshooting. If we can highlight awareness of the importance of taking notes of alarm codes or other descriptive information when equipment fails, then it will be more beneficial during the repair process.

Return on Investment

The SCTCC and SCSU have a lot of history together. Both sites have enjoyed the support of administration for this collaborative effort. We have been able to reduce the cost of regular maintenance on several pieces of equipment at SCTCC including microscopes and autoclaves that were previously being serviced by outside vendors for the going rate. Both schools benefit financially when you consider the cost of flat rate repair or getting a service technician on site for no less than $100 just to step foot into a facility. It is not ambitious to believe that this collaborative effort has saved thousands of dollars over the past 2 years.

Collaborative Successes

Our interprofessional collaboration has enjoyed many successes over the past 2 years. The foundation for BMET experiential learning in a real-time mock clinical environment has been laid. We have implemented a process for timely repair and maintenance of medical equipment used in laboratory and simulation settings. The BMET students have repaired malfunctioning equipment with minimal cost as well as provided cost savings and avoidance for multiple requests. We are now able to express our needs using shared communication and an understanding of each field's unique terminology.

The biomedical students have completed an inventory of all nondisposable medical equipment in the departments that are supported. The inventory is housed in a computerized maintenance management system and includes more than 1000 pieces of equipment. We have shared equipment across departments including infusion pumps, patient monitors, and defibrillators. Biomedical students have worked with the instructor to make equipment purchase recommendations, gather quotes, and create purchase orders, as well as sourcing repair parts at the best possible price.

Conclusion

Many valuable lessons have been learned during this collaborative partnership. We have established meaningful working relationships and created a full inventory of equipment, and all have a better understanding of the fields of nursing and biomedical technology. The biomedical students have learned to work with a wider variety of equipment, and we have been able to share our resources to get the maximum return on the initial investment. The students have had many opportunities to grow their professionalism and customer service skills. We have had interactions with multicultural patients and staff. Student feedback has been used to realign curriculum and maximize the efficiency of this collaborative work.

Preparing the workforce with biomedical equipment technicians and nurses is an exciting challenge. With resources often declining, it is imperative that we all work more efficiently. It is also beneficial to have as true-to-life experiential learning as possible for all students so that they are better prepared for their profession. For any nursing program out there that needs to have equipment issues resolved or any BMET programs that need to get real hands-on experience on a variety of equipment, we recommend you seek out each other as we have done. This is truly a win-win collaboration on so many levels.

Future Goals

As we move ahead, we will focus on new goals and avenues for growth, such as the following:

- Revising objectives for BMET curriculum
- Developing computerized repair request process
- Creating simulations that incorporate equipment repair situations
- Designing on-call assignment for BMET student

- Designing an assessment tool to evaluate students, customers, and employer experience

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APPENDIX A.

Creating the Mock Environment for the Real World

Creating Collaborative Partnerships Between 2 Fields & 2 Schools

Our Conceptual Framework:

	Objectives	Collaborative Successes	Lessons Learned - Future Goals
Collaboration	• Establish a collaborative relationship between the two schools • Develop practical learning experiences that are mutually beneficial	• Laid the foundation for Healthcare Technology Management (HTM) experiential learning in a real-time live nursing lab setting • Initiated a process for timely repair and maintenance of medical equipment used in the lab and simulation settings	• Established working relationships • Biomed students learned and repaired other types of equipment • Creation of an Inventory List for SCSU • Shared about roles of nursing and biomed technology • Better understanding of 2 fields
Communication	• Building a mutual understanding of Healthcare Technology Management (HTM) and Nursing fields as well as their roles and responsibilities	• Mutual ability to express needs using shared communication and understanding of each fields' unique terminology	• Customer Service was provided • Students learned how to deal with multicultural patients • Students presented and gave oral and written instructions about various equipment
ROI (Return On Investment)	• Provide exceptional customer service for all • HTM students gain exposure to current technology and high order trouble shooting	• Completed inventory of all non-disposable medical equipment • Repair of malfunctioning equipment due to the lack of technical expertise & funding • Provided cost savings for the nursing program	• Equipment items were repaired for the Nursing Dept: Ie. EZ Lift, Bed, Call Lights • Increase in knowledge for faculty & students • Items were donated to Nursing from Biomed of items they no longer needed and had repaired, savings cost

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APPENDIX B.

Daily A's -Attendance, Appearance, Attitude, Ambition, Accountability

Components	***Standard Met***	***Standard Partialy Met***	***Standard Not Met***
Attendance			
	In seat when class begins	Late to class-less than 5 minutes	More than 5 minutes late or does not attend class... If student does not attend class, they automatically receive zero points for that class period
	4 points	2 points	0 points
Accountability			
	Is prepared for class with all materials available, reading and assignments done		Is missing 1 or more item for class
	2 points		0 point
Appearance			
	No Infractions of dress code		1 or more infraction of dress code
	1 point		0 points
Attitude			
	Peer Mentor, positive attitude acts as a resource for others		Any observed infractions of attitude includes negativity & lack of solution seeking
	2 points		0 points
Ambition			
	Strives to participate in active discussions and contributes regularly in class sessions		Contributes to class room discussions when asked/guided or does not contribute. Contrubutes more than necessary to the point of disruption.
	1 point		0 points