IPRO It takes a team!
INTERPROFESSIONAL PROJECTS PROGRAM

Orthotics and Prosthetics in Latin America
IPRO 309

H.O.P.E
Human Orthotic and Prosthetic Education

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Motto: "Estamos ayudando a nuestros amigos, one step at a time."

EXECUTIVE SUMMARY

The purpose of this report is to summarize the work done over the course of the semester by the IPRO 309 team. The work of this IPRO spanned 14 weeks of the semester. IPRO 309 was started in the spring of 2006 with the intention of establishing a solution to the demand for orthotics and prosthetics in Latin America. In Latin America, there are currently 50 certified and 1500 uncertified orthotics and prosthetic practitioners catering to 2.5 million people in need of care. An ISPO (International Society for Prosthetics and Orthotics) accreditation is

required for a student to become a certified practitioner; however, there are currently only two ISPO certified programs in Latin America. The program in Colombia was established in October of 2004 in Bogota, Columbia with support from Centro Don Bosco (Bogota, Columbia), Don Bosco University (San Salvador, El Salvador), and the Laboratorio Gilete (Bogota, Columbia). In the United States, the American Board of Certification in Orthotics and Prosthetics is the organization that grants accreditation for orthotics and prosthetics. Currently, in the United States accreditation may be accomplished through an associates program, a bachelor's degree, or a master's degree in the field. The equivalent in Latin America is roughly correlated into three ISPO certification categories. Category I indicates a professional with abilities in production, treatment of patients, as well as research and development. Category II certified practitioners have the ability to fabricate devices as well as directly care for patients, while Category III is responsible for the design and manufacturing of orthotic and prosthetic devices.

In previous semesters, a Category III exploration of accreditation had been explored. By now, the Category III program is well-established in Bogota. This semester attempted to focus on the requirements for a Category I accreditation program. The hope is that once students achieve Category I certification, they will be able to teach the next generation of O & P practitioners. Utilizing all of the data collected from previous semesters, an inquiry-based learning program was established to gain a more holistic approach to teaching a student the under-emphasized aspects of the patients they with whom they would be working. This included the psychological aspects, the fabrication aspects, as well as the methodology in which the curriculum would be established.

PURPOSE AND OBJECTIVES

There exists a strong demand for orthotics and prosthetics (O & P) in Latin America, with approximately 2.5 million people in need of this type of care. However, there are only 50 certified and 1500 uncertified O & P practitioners in Latin America. IPRO 309 was started in the spring of 2006 with the goal of helping to make this type of care more readily available. In order to become a certified practitioner, a student must graduate from an ISPO (International Society for Prosthetics and Orthotics) accredited program. Unfortunately, there is currently only one ISPO accredited program in existence in Latin America, along with several other programs that are not ISPO accredited. In October of 2004, Centro Don Bosco (Bogotá, Colombia), Don Bosco University (San Salvador, El Salvador), and Laboratorio Gilete (Bogotá, Colombia) signed an agreement to establish the first accredited O & P education program in Colombia. Since then, Centro Don Bosco has allotted 3,500 square feet of space for the thriving faculty, classrooms, manufacturing training, and vocational workspace that are necessary for an ISPO accredited program.

There are three levels of accreditation according to ISPO standards. Category III involves the design and manufacturing of orthotic and prosthetic devices, Category II includes the fabrication of the devices as well as direct patient care, and Category I includes production, treatment of patients, and research and development. The equivalent to ISPO in the United States is the American Board of Certification in Orthotics and Prosthetics (ABC). Because it is independent from the ISPO, the ABC standards of accreditation will need to be taken into account in order to carefully cross cultural and national boundaries.

A Category III program has started at Centro Don Bosco in Bogotá. For students who begin the program, the chances for career advancement are greatly increased with the possibility of attaining Category II (or further) certification. Classes first opened in February 2005 with 17 students. Though the number of students may be small, their impact will be massive; in one year, each student can produce over 250 orthotic and prosthetic devices. The first graduating class can therefore affect a total of over 100,000 patients throughout a projected career of 25 years. This was accelerated with the aid of IPRO 309 by creating educational modules necessary for the program to receive ISPO accreditation while providing basic material to students interested in the program.

In addition, several other institutes have joined to provide education and care to those in need. These institutions are listed below.

- Universidad de los Andes; Bogotá, Colombia
- La Escuela Colombiana de Rehabilitación; Bogotá, Colombia
- Centro Don Bosco, Bogotá; Colombia
- Laboratorio Gilete, Bogotá; Colombia
- Bioconcepts, Inc.; Burr Ridge, IL
- Dynamic Orthotics and Prosthetics; Houston, TX
- Children's Memorial Hospital; Chicago, IL
- Joliet Junior College Tech Prep Program; Joliet, IL
- Northwestern University Prosthetics and Orthotics Center; Chicago, IL
- Illinois Institute of Technology, Chicago, IL

However, there is still a need for Category II and/or Category I programs in Latin America.

The overall goal of our IPRO team was to begin the process of creating an ISPO Category I accredited orthotics and prosthetics education program that would be sustainable in Colombia. This was accomplished by examining similar programs already in use around the world, adapting their structure, and adding or changing components of their curriculum to suit the needs of the prospective students in Bogota, Colombia.

ORGANIZATION AND APPROACH

In order to formulate solutions to the problems outlined above, the IPRO group revisited the work and research that has been done in IPRO 309 since its conception in 2006. This served not only to educate current members of the IPRO on O&P (Orthotics and Prothetics) issues, but also to reveal areas where the current team could work more efficiently. Three sub-groups were then formed consisting of three members each, working on an area requiring growth and improvement. The three subgroups are as follows:

Subgroup 1: Consolidating Past Research and Curriculum Development

This subgroup consolidated, organized, and summarized research done by past IPRO 309 teams. There has been a need for such a subgroup for some time. Materials from past semesters, as well as documents from this semester, were organized in a binder and uploaded to a website for easy access. These materials were then used to supplement a curriculum that meets the standards set forth by ISPO.

Subgroup 2: Materials and Manufacturing Education

This subgroup researched information about O&P devices and developed a model to be used as a teaching tool. This subgroup learned about the various processes involved in making an O&P device. They also learned about the many types of O&P devices and the standards set forth by ISPO for said devices. This subgroup then developed an activity to incorporate project-based and problem-based learning into the current curriculum, as outlined by ISPO.

Subgroup 3: Addressing Psychosocial Aspects

This subgroup researched the psychosocial aspects of needing and learning to use an O&P device**.** Psychosocial aspects are far too often overlooked in the care of individuals who need O&P devices. This subgroup focused on integrating psychosocial education, again with a focus on problem-based learning, within the existing ISPO curriculum.

The three groups collaborated and combined information. Weekly updates including timelines specific to goals were given throughout the semester. Each subgroup held separate meetings outside schedule class time. Every Tuesday session of the IPRO, subgroups gave a 5-10 minute presentation on their current progress and goals for the upcoming week. In addition, groups utilized the iGroups portal and Google Documents to send emails and upload files.

ANALYSIS AND FINDINGS

The three subgroups researched orthotics and prosthetics education, and determined that there were a few elements missing from the existing curriculum. The students found that, in their opinion, the psycho-social aspect of patient care was not properly addressed by any of the recommended classes for an ISPO Category I program. In addition, the team thought that all of the classes would be more effective if they were more interactive. The team divided these topics into three areas, to be covered by the three subgroups. The psycho-social aspect of patient care was addressed by the Psycho-social sub-team. The Materials and Manufacturing Education team worked with interactive education methods related to materials and fabrication courses. The Curriculum team looked at broader concepts in education and teaching to see what might be the best way in which to structure the courses.

Inquiry-Based Curriculum

In the fourteen weeks of the semester, IPRO 309 worked on establishing an inquiry-based lesson that could be verified by both the American Board of Accreditation for Orthetists and Prosthetists as well as verification by ISPO for use in Latin America. Inquiry-based learning is a technique that is already in practical application at universities in the United States such as Harvey Mudd College. This is a technique that is utilized by medical, law, and business professionals to provide real life examples for students. It is a technique that establishes ownership of data being learned by the student through either case studies or ill-structured problems. This technique establishes a connection between the student and teacher, in that the teacher is held accountable to knowing what the student thinks and why. Brooks and

Brooks(1993) state, “teachers who operate without awareness of their students’ points of view often doom students to dull, irrelevant experiences, and even failure”.

The ill-structured problem technique that was to be utilized by professionals would follow a simplified model. Initially a problem or scenario would be presented to the students. This problem would be novel in that students should not have enough information to solve the problem. The student would have to proceed to list their knowledge about the scenario, and then develop a problem statement. The students would proceed to establish a list of data that is needed. Finally, students would pursue the solution to the problem established. Repeatedly students would be forced to explain and ascertain their solution. In this manner students would seek knowledge, a skill set that in itself would be necessary for the variable tasks associated with orthotists and prosthetists in a clinical environment.

To create such a lesson required the involvement of the entire IPRO team. Each subgroup was tasked with the exploration of academic material to be collectively organized into a project for other students to utilize. The academic topics covered included patient psychology as well as the physics of fabrication. Patient psychology was chosen because the mental state of the patient, as well as the dynamic between the practitioner and the patient has a tremendous affect on the behavior and recovery of the patient when undergoing rehabilitation. When the ISPO and ABC standards were observed, there were currently no courses required for such issues. The physics was important in an ill structured environment because often times core principles are not retained over the course of the degree. Forcing the student to make observations and revisit principles on their own reestablishes this knowledge to be more concrete. Both topics were organized into a problem that is applicable to patients of diverse stature, age, and condition, “How does one get out of a chair?”

In an attempt to establish a project for students to explore this question, IPRO 309, had to undergo the inquiry-based learning process ourselves. As students in IPRO 309, we ourselves did not know the answer, and so in searching to teach, we learned the answer for ourselves, and established a solution with physiology, material science, and psychology. Additionally, inquiry-based learning has no cultural boundaries, as the students themselves take ownership of the solution to the problem with their own background, making this technique feasible in Latin America as well.

The curriculum team decided to look at what kinds of interactive learning experiences were currently being used by educators. They found that a good way to convey a particular idea or explore a given concept was to use problem-based educational methods. This means that the students are given a problem, and work either independently or collaboratively to solve the problem, gaining a better idea of the concept which they are supposed to be learning at the same time. The problems should be ill-structured and open-ended; there should not necessarily be a right or wrong answer. The process used to arrive at the solution may be more important than the solution itself. This was found to be more effective than the use of case studies, which generally provide a good example of how a problem was dealt with, but do not allow for students to form independent solutions. After realizing this, the curriculum group started to form a sample problem that could be applicable to a variety of topics within the field of orthotics and prosthetics. The problem they chose was helping a “patient” get out of a chair. While this may seem a simple task, getting up out of a chair requires a sequence of movements, which in turn requires the use of numerous muscles. To give step-by-step

instructions to someone who is trying to get up from a chair may be more difficult than it sounds. The team made this applicable to orthotics and prosthetics by adding a variety of possible “disabilities” which may make it more difficult (or impossible) to get out of a chair. The activity was written out with instructions for the class instructor as well as instructions for the students. It was also typed up both as an in-class activity as well as a take-home assignment. After further discussion, questions were added to the activity along with other variations in age, gender, medical and living conditions, etc. This activity brought up more questions than answers for our IPRO team. As the team became more and more interested in the patient and what the implications of their different conditions were, the students began to raise additional questions and request more information. This activity also raised the level of empathy for the "patient" that the team felt. This increased empathy will be good if this activity is used by actual instructors in the O&P field.

The psychosocial group started by looking at the different programs that existed within the ISPO Category I curriculum. The group found very little exposure existed within the current curriculum. Using the experience within the group, this group was able to aid in showing the importance of patient caregiver interaction. They realized that patient education is a concern that is not addressed but realistic in the current curriculum. After realizing this, using the information produced by the curriculum group, the group produced methods of addressing patients. An example would be a flow chart or a checklist that the ISPO Category I students could use to learn from. The patient education and patient caregiver interaction part of the field is a field that not much attention is brought upon. The group also realized the importance of a class where students could get experience communicating with the patient to understand the true needs of the patient to improve their activities of daily living and quality of life.

The manufacturing and materials sub-group found ways to integrate problem-based, student-centered learning in O&P manufacturing classes. The team prepared a few small activities related to the IPRO's primary activity described above. The students of IPRO 309, several of whom are engineering students, realized the need to learn think critically rather than mindlessly apply equations to problems. The activities and papers they prepared challenged the prospective students to look at the problems from multiple angles and to consider aspects of the problem that they would not otherwise think of. Several students from IPRO 309 went on a field trip to BioConcepts, a facility that treats orthotics and prosthetics patients and manufactures the needed devices. During the trip, the students were able to go through the entire process of making a custom ankle-foot orthosis. This activity was similar to the hands-on experience that the team believed to be necessary for a comprehensive education.

CONCLUSION AND RECOMMENDATIONS

The general conclusion that the team reached was that problem-based learning needs to be incorporated into the educational experience at the proposed ISPO Category I institution. In addition, coursework in the psycho-social aspect of patient care was determined to be a necessary addition to the current list of recommended classes.

The problem-based learning initiative is important because the team decided that this method of learning is more effective than the standard lecture format. Specifically, ill-structured, open-ended problems were found to be useful in provoking students to think critically and

come up with solutions, in addition to further queries, independently. Also, as has been mentioned above, there exists a need for more comprehensive coverage of the psycho-social aspects of patient care in the courses recommended for the Category I curriculum.

The team recommends, therefore, altering the existing courses to give a greater emphasis to student-centered learning. The work this past semester has been very qualitative. A completely new direction has been established for IPRO 309. We strongly recommend that the Fall 2010 IPRO 309 students continue with our work, moving from qualitative research to quantitative research and development. Further work is needed if the current semester's progress is to be implemented. Therefore, a binder containing all of the information from this semester, and all the previous semesters, has been given to Dr. Meade to give to the new students in the fall. In addition, at least one or two of this semester's students will be returning in the fall to continue the work of this IPRO.

APPENDIX

Expenses

Field Trip to BioConcepts (full day): $100

Printing Materials for IPRO Day: $30

Team Strengths and Skills

Team Member	Skills	Learning needs	Expectations
Ashley, Trevor	-Problem solving -Leadership within a group, -Willingness to learn to skills	-Working with others that don't share the same ideas as me and to compromise with them	To learn something about the materials and bio-mechanics of prosthetics and orthotics
Fischer, Stephanie	-Medical Terminology -Anatomy -Previous Experience	-Continue learning more about O&P -Develop Team Work Skills	To continue learning and hopes everyone does there part
Kim, Joseph	-Creativity	-Learn more about leadership	
Kumontoy, Allton	-Adobe Illustrator -3D Studio Max -Photoshop - Auto CAD -Indesign	-Gain a better understanding of the Orthotics and Prosthetic field	To learn more about Orthotics and Prothetics
Lasowsky, Oksana	-Informal education	-Learn more about O&P and the customer we are designing the device for	Learn more about the education process and teaching people how to use O&P devices
Miller, Luke	-Analytical Problem Solving -Mechanical and Civil Engineering	-Team Work -Project Management	Accomplish something tangible
Sardi, Carlos	-Mechanical Engineer -Fluent in Spanish -Knowledge with Latin American Culture	-Develop Organizational Skills -Getting to Class on time -Working in a team setting	Have fun and learn how to we can help other people with prosthetic and orthotic devices
Shaw, Jessica	-Organizational Skills -Good writing skills -Speaking and Presentation Skills -Creating Itineraries	-Improving Spanish speaking and understanding -Learn about O&P -Understand Culture of Colombia	To bond with the IPRO team and learn more about O&P devices. Also learning more about Latin American Culture
Song, Matthew	-Overlook differences to accomplish a task	-Leadership Skills -Learn more about O&P	Learn about the IPRO system and make a difference in Latin America

REFERENCES and SOURCES:

Ron Seymour.Prosthetics and Orthotics: Lower Limb and Spine.

http://www.oandplibrary.org/alp/chap28-01.asp

Kevin Meade, PhD