

## Final Report

### IPRO 309: Educational and Technical Support of Orthotics and Prosthetics Education in Latin America and the US

#### 1. Introduction

Our objective this semester was to continue supporting the Orthotic and Prosthetic (O&P) Technician training program in Bogotá Colombia. Last semester the teams developed 5 educational modules that will aid as teaching material, and review material. A bilingual website was also developed to transmit information to teachers and to make the information more accessible for use. This semester we created additional modules and also extended our network to start working with Joliet Junior College in Joliet, Illinois to support their O&P program that is starting in January of 2007.

#### 2. Background

There are over 513 million people (2000 Census) living throughout Latin America and the Caribbean. And yet there is only one International Society for Prosthetics and Orthotics (ISPO) accredited school, located at the Don Bosco University in El Salvador. There are three unaccredited schools, two in Mexico and one in Argentina. The United States, with a population of almost 300 million (2000 Census) is home to 13 accredited O&P educational programs. It is estimated that there are less than 50 certified O&P practitioners and 1500 uncertified practitioners. There are approximately 2.5 million people throughout Latin America with unmet needs in the area of orthotic and prosthetic care. There is a very high unemployment rate for Physicians and Physical Therapists in Colombia, yet due to the scarcity of technicians who are able to build devices, there is a drastic. This statistic shows the need for accredited O&P technician programs throughout Latin America.

The school we are working with, Centro Don Bosco, is a colegio or trade school. In February of 2005 an O&P program was started there to train technicians. Because it is new, this program is not yet accredited. When students graduate they will not be able to acquire a license from the ISPO. The situation is similar at Joliet Junior College.

There is a new law in Colombia that in the next few years all orthotics and prosthetics practitioners must be certified. With the lack of accredited training programs, this will mean an even greater scarcity of practitioners, and make the education program at Centro Don Bosco even more necessary.

The cost of a student to matriculate and complete the O&P program at Centro Don Bosco is approximately \$3000. This is inclusive of equipment and tuition expenses. This is a small expense when compared to the number of patients that could be treated. Many orthotics devices can be fabricated in one day, or overnight. This allows us to estimate that since most fulltime O&P practitioners see approximately 250 patients a year, with a modest career of years, that comes out to less than \$1 per patient to train a technician. So although the initial cost may seem high, it is minimized over a lifetime of practice.

### 3. Purpose

The initial objectives of the IPRO was to develop educational modules that will aid in the accreditation of an ISPO Category Three program. The Category Three program involves training Orthotists and Prosthetists who are able to build devices to improve patient's quality of life. The modules are being implemented in Bogotá, Colombia at Cento Don Bosco High School and also at Joliet Junior College, in the United States. We are trying to develop hands-on, interactive sessions that can be used as learning and review material in the subject of the biomechanics of human movements. The group was divided into subteams to cover the topics:

- Palpation of anatomical landmarks and orthometry measurements

- Range of motion testing and manual muscle testing

- Evaluation of sitting and standing posture

- Dermatomes, myotomes, reflexes and the spinal cord injuries

- Observational gait analysis and use of crutches, canes, and walkers

By the end of the IPRO, each subteam should have developed a highly engaging 2 hour presentation that can be used in the class room setting.

- By the end of this semester, each member of the team will have knowledge of all 5 different modules and be able to perform any of the tests discussed.

Obstacles considered included time and people resources. Because of the size of our team (10 members) the maximum number of topics that could be covered in the proper scope was determined to be 10, combined into 5 groups of related subjects. The semester we had no native Spanish language speakers, thus the translation of our material will be conducted later by a supportive affiliate outside of our team.

An objective added partway through the semester involved preparing a composite presentation for a group of students and faculty at the Northwestern University Prosthetics and Orthotics Center (NUPOC). This was a unique opportunity, which was not available to the IPRO in the spring of 2006. This was advantageous because it was an excellent way for the modules we have developed to be evaluated by individuals with expertise in the areas of O&P, checking the accuracy and clarity of the information we present in the modules.

### 4. Methodology

Research was conducted by the individual subteams on a weekly basis. It was a very involved process in which students had to learn a great deal about a particular subject in O&P. Taking this new information, we then had to compile in such a manner that would be understandable for students at the high school level. Our faculty advisor, Professor Kevin Meade, a licensed Orthotist as a research seminar, used the biweekly team meetings to present case studies that demonstrated the interconnectedness of all aspects of O&P care.

We incorporated hands on and visual learning in our biweekly meetings. We did case studies almost every class, to see if we were able to apply the knowledge from our research into real life examples. Not only was it a valuable learning experience but it also allowed us the opportunity to share our knowledge and to gauge our own personal levels of understanding. Performing these activities tested the feasibility of taking them and using them in the high school classroom. For example, when learning about postural analysis we actually performed postural evaluation on one another. We purchased a laser level, which can be used to clearly and easily demonstrate the principles of biomechanical alignment. The research was done mostly in the subteams. Every other week we presented our findings to our fellow team members. Weekly team reports were scheduled once most of the research had been conducted. The purpose of these was to educate the rest of the team on the fine points of each topic.

## 5. Assignments

The assignments are listed in subteams:

Michael Addis and Katy Pyles were Group 1 in charge of the ‘Palpation of anatomical landmarks and orthometry measurements’ module. They provided modules which is inclusive of an activity that aids in teaching students how to fill out an orthometry sheet properly and how to interpret the information from an orthometry sheet properly.

Group 2 consisted of Dan Wido and Andrew Swantek. They created presentations that teach the basics of ‘Range of motion testing and manual muscle testing.’ They also created an entertaining activity for students in which they can perform dance moves by following instructions given in the correct anatomical terminology.

Group 3, Amara Ogbonnaya and Jared Gardner, designed material to cover the topics ‘Evaluation of sitting and standing posture.’ The group used examples to demonstrate correct posture and poor posture. They also provided case studies to show how to properly perform the postural analysis.

Russell Derrick and Eduardo Aramayo were Group 4, and covered ‘Dermatomes, myotomes, reflexes and the spinal cord injuries.’ They provided an overview of the major reflexes and the nerve branches responsible for them.

Alayna George and Julia Northrop formed Group 5, “Observational gait analysis and use of crutches, canes, and walkers.” Their purpose was to provide an explanation of the basics of gait analysis—watching the way a person walks to determine pathology. The other half of their presentation was on the differences between why crutches, canes or walkers would be prescribed and the basics of how to use a pair of crutches.

Another team was formed for the presentation at NUPOC. Professor Meade gave a background presentation about the purpose of our project and what we plan to accomplish as well as covering what we hoped NUPOC could help us with. Dan Wido gave a background presentation that covered the anatomical planes, motions of body: adduction, abduction, flexion, and extension. Jared Gardner and Amara Ogbonnaya were responsible for presenting information on stroke or cerebral vascular accident (CVA) and the effects on the nervous system including: drop foot, contractures and the effects on gait. Russell Derrick and Eduardo gave a presentation on Lumbar Vertebral

Compressions and the effect on nerve conduction and the level of nerve impairment that can result.

## 6. Obstacles

One of the main challenges faced was trying to take all the new information that we learned, pick out topics that were fundamental or essential for high school students to understand. Each subteam was responsible for a very extensive amount of information, initially the amount of information was quite intimidating. The extent of research performed by subteams had to be in depth so that each subteam could have a solid foundation, in a subject matter that they initially knew little or nothing about.

Another challenge faced was communication within subteams. Due to lack of communication between subteam members some deadlines had to be extended or reevaluated. In addition to have some confusion about deadlines and milestones, we also faced the situation of redundant data. At first, each presentation had a background covering basic body motions and anatomical planes. Our team came to the general consensus that it would be more beneficial to have a single review presentation, so that each module could be more focused on the designated topic.

## 7. Results

We successfully made the intended modules. Each module has some interactive components creating a very engaging experience for the students.

As mentioned, we also created an additional module to use as a review before students use the 5 modules.

The presentation to NUPOC was a great success. The integrated presentations really helped the team itself understand what this is all about. We were able to gain feedback on the accuracy of our information. For the most part our information was correct; there were a few instances in which the experts there corrected us.

We had originally planned to translate our materials into Spanish this semester, but as the semester came along it became apparent that was not possible.

A less tangible result of the project was the learning experienced by each team member. 8 out of our 10 team members are engineering majors, with a science and psychology major filling the two other roles. With our strong backgrounds in engineering and technology, it was a difficult task to think as a clinician should. By the end of the course, however, all of us have gained knowledge of the complexity of even a small branch of the medical field. We have overcome our way of problem solving, and have learned to focus on the desired quality of life of the patient.

As we learned more, the subteams began to teach the class. Clinical tools were purchased and demonstrated. Using a laser level, we found that one of our teammates has a small scoliosis, or curve of the spine. Another one has a “flat back.” Due to a kitchen accident

in college, Professor Meade has a loss of sensation in his left arm that was used to demonstrate some of the neurological principles being learned.

## 8. Recommendations

To gain a true understanding of the O&P field, Professor Meade's case studies were very helpful for our team. These are highly recommended to introduce the next team to the complexities of the problem. Also, the hands-on demonstrations done in class gave us the opportunity to test our knowledge and be corrected in a safe environment. Utilizing Professor Meade's professional experience is recommended for the next team.

## 9. References

International Society for Prosthetics and Orthotics  
<http://www.ispo.ws>

I PRO 309, Spring Semester 2006  
<http://www.iit.edu/~ipro309s06/>

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Trauma surgeon from Bogotá who practices orthotics and prosthetics in Colombia and in the US (Dynamic O&P, Houston, TX).

He was on the spring 2006 I PRO team trip.

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Faculty and Students at

Northwestern University Prosthetic and Orthotic Center, Chicago, IL

O&P Textbooks and materials provided by Professor Kevin Meade

## 10. Acknowledgements

Rotary Club

Dr. Gomez

Bryan Malas

NUPOC

most of all, Prof. Kevin Meade and the I PRO Department, IIT