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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The Interprofessional Projects Program (IPRO®) at the Illinois Institute of Technology

Teamwork, innovation, and complex **problem-solving** skills make successful professionals—and reflect the overall performance of their organizations. The IPRO program was developed in 1995 and since then has been teaching students how to excel in the workplace by providing them the practical tools that can make a difference in their professional and personal lives. The IPRO program joins together students from **various academic disciplines** to work as a team to tackle a **real-world problem**.

Such **experiential learning** reinforces traditional education methods, providing students a **richer academic experience**.

1.0 Executive Summary

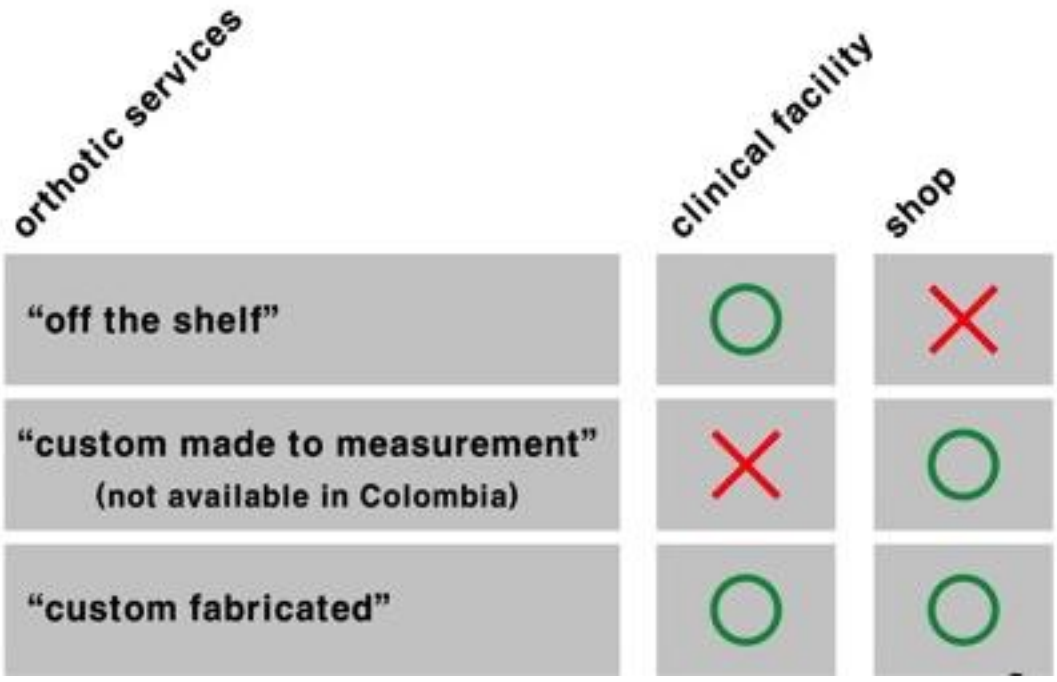
The purpose of this report is to summarize the work done over the course of the semester by the IPRO 309 team. The work done for this IPRO spanned the entire 14 weeks of the semester.

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. IPRO 309 was started in the spring of 2006 with the goal of helping to make this type of care more readily available. However, there are only 50 certified and 1500 uncertified, O & P practitioners in Latin America. In order to become a certified practitioner, a student must graduate from an ISPO 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 the 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 for 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.

Now that the program has started at Centro Don Bosco in Bogotá and the goal is to achieve Category III accreditation. 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 opened first 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.

In the US, there are three types of O & P care currently available to those who need it. The figure below shows these three types.



Off the shelf services are devices that can be bought packaged and simply adjusted to the patients needs. There are the custom fabricated devices. This is the method currently used in Colombia, and this method can take up to 6 hrs. Custom made to measurement, a service not available in Latin

America, is a service that allows a shop to stock several standard sizes of orthotic devices (like a shoe store), then the patients measurements are used to fit the closest size to the patients needs. This service is provided at "Central Fabrication labs". The goal for IPRO 309 in the Fall 2009 semester was to create a business model for implementation of this type of orthotic care in Latin America.

1.1 Central Fabrication

Central Fabrication is the process of "outsourcing" the fabrication of custom orthotics and prosthetics. Central Fabrication can be implemented to handle the heavy workload of production for orthotics that small clinics cannot. As mentioned earlier in the report, the need for O & P care in Latin America is HUGE. The current way of developing orthotic devices in Latin America can take up to 6 hrs. If we consider the number of patients who require O & P care and the low number of certified practitioners, it would take a lifetime to satisfy all of their needs. That is why a program like Central Fabrication would go a long way in providing O & P to more people in Latin America, starting in Colombia. The process is very simple:

1) A patient meets with a clinician and a service sheet is filled out listing the complete measurements of the part of the body needing the orthotic.

2) The measurements can be called, faxed, or emailed over to the Central Fabrication lab.

3) The orthotic is delivered to the patient in a few days. Generally, for a typical Ankle Foot Orthotic the turnover time can be as low as 2-3 days.

Over the course of the 14 weeks in the semester, the IPRO 309 team worked to build upon the work done by Centro Don Bosco. The group was divided into three separate concentrations: Business, Technical, and Impact. The goal of the IPRO was to develop a method for implementation of a Central

Fabrication program at Centro Don Bosco. After understanding the process of Central Fabrication, the three groups began taking the necessary steps for implementation of a program.

The business group would focus on creating a business model for the program. The goal of the program would be to create a work-study program at Centro Don Bosco that could train the students to develop the "made to measurement" orthotics. Essentially, the profit from the Central Fabrication would be used to fund the work-study. Over the past three years, the overall goal of the IPRO has been to promote O & P through educational modules. Our group is taking a different approach. Through the implementation of a Central Fabrication program, we can establish a work-study program at Centro Don Bosco. This program would take the high school students who are already learning about O & P devices, and allow them to receive hands on experience making the devices. These devices would then be sold at a lower market value that could greatly benefit those who cannot afford a regular orthotic device. Supervising O & P practitioners would control the quality of these devices. We feel this program continues with the overall objective of IPRO 309 because it is fostering the O & P practitioners of the future, and continuing to promote awareness of this type of care.

The technical group would focus on understanding the product line for the development of the orthotics. In addition, the technical group worked to develop a temporary orthotic concept which could be made for the patient on location. This would greatly reduce the turnover time for the orthotic. Once the orthotic was completed, it would replace the temporary mold.

The impact group would focus on awareness of Central Fabrication as well as working externally to find a cooperating clinic for the implementation of the program. The group would also focus on outlining the benefits of the program for all parties involved.

2.0 Purpose and Objectives

It was important to IPRO 309 that not only people in Latin America receive proper O&P care, but that they receive it as soon as possible. Our group first wanted to deal with prosthetics, but we knew this would be too costly and time consuming. For this reason, the group shifted its focus to orthotics, specifically Ankle Foot Orthotics (AFO). These orthoses can take time to make, with the shortest wait being a few days long. The technical group started to think of ways to reduce this time. The first idea the group came across was the creation of a temporary orthotic.

Ankle Foot Orthosis- AFO

The production of a temporary orthotic onsite could allow the patient to receive **immediate** orthotic care. This would also allow the patient to have an orthotic while they wait for the production of the permanent orthosis. The wear and tear of the temporary orthotic would not be a major issue as it would only be used for a couple of weeks at maximum.

The first prototype the group thought up was one inspired by Soccer Shin Guards. Shin guards can be easily purchased at any sporting goods store, and can sometimes be heated and molded to fit. The second prototype that was thought up was one created by Friendly Plastic. Friendly plastic consists of small beads which are heated in water and create a moldable plastic. This would allow for a more freeform method of orthotic fabrication as opposed to the thermoplastic sheets in the shin guard prototype. We will discuss both of the prototypes further in section 4.0

The business group wanted to create a system that could help fund the education of the students at Centro Don Bosco. The IPRO 309 knew that the convergence of the three groups in any objective would be important. After some discussion with our advisor, we came across the idea of central fabrication. As described in the Executive Summary, this system could easily be implemented into the curriculum and would essentially "pay for itself". The impact group would focus on the communication with clinics that could benefit from the mass fabrication of the orthoses. Finally they would research ways to promote awareness of O&P careers and care. Below are the specific objectives for each subgroup:

Technical: *To develop feasible method for creation of temporary orthoses. The group will also develop product line for business plan and understand all other technical aspects of Central Fabrication.*

Business: *To develop a plan for implementation of Central Fabrication program at Centro Don Bosco. This program will cover organization, management, work study program, marketing, etc.*

Impact: *To focus on promoting Telemedicine in Colombia with local clinics. The group will also research methods of promoting O&P care and careers in Latin America.*

3.0 Organization and Approach

In order to cover all aspects of implementation, three sub-groups were then formed consisting of three to four members working on an area requiring growth and improvement. The following are the three sub-groups:

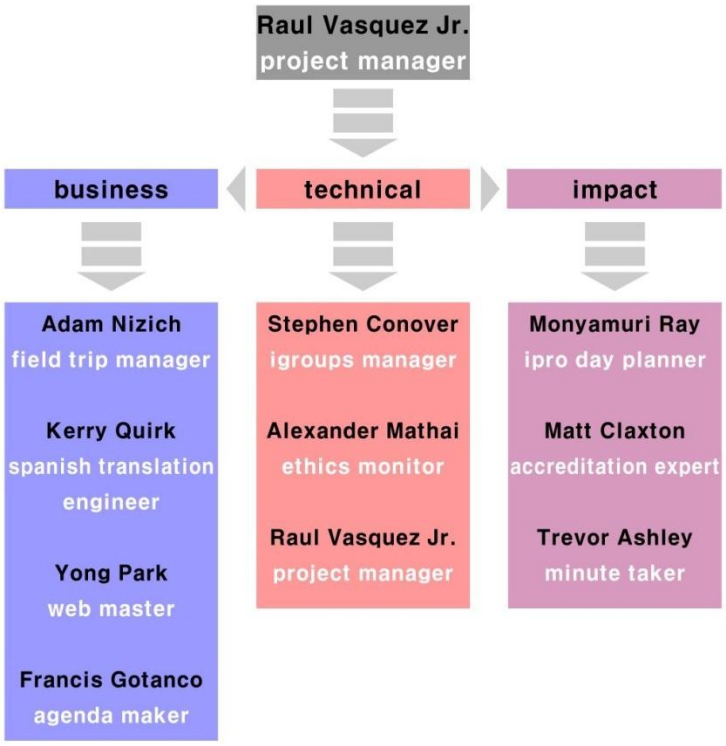
Business

Technical

Impact

The team worked towards a common goal, and wished to propose the goal with appropriate reasons to Don Bosco University, Colombia. Each sub-group identified all of the tasks that must be completed in order to fulfill the goals as well as reach the main objective of the IPRO project. Each individual sub-group on current technical and business states of the IPRO project conducted research during the 14 weeks by observing the work of previous semesters, specifically their deliverables. Research was conducted to discover what resources were available (technology, financial resources), and the use of comparative effectiveness research was also utilized.

3.1 Group Organization



3.2 Research

The Business group will be translating documents sent to the team by Don Bosco University. The Technical group will do research on the methods used to build a limb —from beginning to the end — in order to find a method for maintaining or improving the device's efficiency after reduction of production costs.

The Impact group will be researching methods that can be used for Transfer Technology, Social Awareness and Prosthetic and Orthotic Education with the business modeling. All three subgroups will create surveys / public polls to gain an insight into the public knowledge of the growing need for O&P devices in Latin America.

3.3 Communication

The three groups will collaborate and combine information. Weekly updates including timelines specific to goals will be required for the remainder of the semester. Each subgroup will host separate meetings between each session. Every Tuesday session of the IPRO, subgroups will be required to give the entire team a 5-10 minute presentation on their current progress and goals for the upcoming week. In addition, groups will communicate use the IGroups portal to send emails and upload files.

3.4 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 idea as me and to compromise with them	To learn something about the materials and bio-mechanics of prosthetics and orthotics
Claxton, Matt	-ProE -Solid Works -CAD Key -MS Office Suite -Team Oriented -Detail Attentive	Working with team	I hope that the work done this term will benefit the long term goals of this IPRO
Conover, Stephen	-Matlab -Microsoft Office -Decent multi-tasking -Some circuitry knowledge	Learn more about the circuitry that goes into prosthetics.	To learn more about prosthetics, how they work and how they're built.
Gotanco, Francis	-Microsoft Office -Organizing events -Research -Coordinating teams and information, etc.	Learning the business side of a technical project	Field Trips and to make a difference in the lives of those who live in Bogota Colombia.
Mathai, Alexander	-Understanding of efficient human movement as an athlete -Engineering skills from civil engineering program.	Time management	Interest in bio mechanics and kinesiology
Nizich, Adam	-Planning Trips -Problem Solving -Structural Analysis -Mathcad -International Development	-Business Planning -International Development	Completion of IPRO help OP education
Park, Yong	-Auto Cad -3D Max(3D renderer) -Photoshop -Illustrator -Dreamweaver -Photography -Great focus -Design Oriented -Military Experience	Cannot do multitask	Completion of IPRO
Quikr, Kerry	-Spanish language skills -Knowledge of the history and political climate of Colombia -Knowledge of the governmental structure of Colombia basic -Cultural knowledge of Latin America	basic knowledge about the function and development of prosthetics, an increased knowledge of how to create and develop business plans for companies	To help make a difference in the Colombian society, both with Don Bosco as well as those who are impacted by those educated at Don Bosco
Ray, Monmayuri	-Matlab -Labview -Autocad 2000 -ProE -Microsoft Office -C/C++ -Visual Basic -Java -Multi-tasking, hard-working, well spoken, goal-oriented	-Business Planning -Team Work -Learning methods for social awareness.	To be able to make a difference and making the program of Orthotics and Prosthetics education more efficient in Colombia.
Vasquez, Raul	-Strong leadership skills -Work very well with others	I hope to master my delegation skills	I'm hoping to really do something important and meaningful with this IPRO.

4.0 Analysis and Findings

IPRO 309 began this semester by analyzing the goals that have been established so far and finding where we could help the most. The problem we found was there was no appropriate technology for the customized fabrication. Our analysis and results is solely based on primary and secondary research and communication with Centre Don Bosco, various O and P resources. The analysis can be divided into three categories again.

Technical

Business

Impact

As far as the business in concerned, the goal was to create a business model in which Centre Don Bosco could establish a work study program for central fabrication, custom made to measurement orthotics and prosthetics. The result includes Market Analysis, Company Description, Organization and Management, Marketing and Sales Management, Product Line, Funding Request and Financials. Market Analysis The Market Analysis program contains a variety of possible locations that it is possible for Centre Don Bosco to create a work study program for central fabrication , custom made to measurement orthotics and prosthetics. While the clinic in Villivicience Colombia , a physical therapy clinic has an agreement with Laboratorio Gilette in which they go down once a month and treat patients, is the case study we have used but there are other options that we have come up with which will be discussed in the Impact Results.

4.1 Technical

4.1.1 Temporary Orthotic (Shin Guards)

The technical group developed 2 methods for creating a temporary orthotic. The first method was adapted from ordinary shin guards. Shin guards are a protective piece of sportswear that consists of a solid piece of plastic covering the shins of the player. Our group focused on one specific type of shin guard which can be heated and molded to the shape of a person's leg. This type of shin guard is made by a thermoplastic. Thermoplastics would be easy to use because their elastic properties change when they are heated.

To build the prototype, we purchased a pair of Nike Moldable shin guards. We heated the shin guards in hot water for about 5-10. While the shin guards were heating, we placed a stockinette over the subject's leg to avoid burning their skin during molding. After 10 minutes, we removed the shin guards from the hot water. One guard was then placed around the calf of the subject, and the second was placed under the foot with about an inch and a half of the guard wrapped around the back of the heal (to mimic and ankle foot orthosis). Another stockinette was placed over the guards to keep them in place and to allow for cooling and molding. After 20 minutes, the stockinettes were removed and the shin guards were molded.

Advantages:

One thing we liked about the shin guards is the ease of molding. The entire process took less than an hour, and the molds were much harder than when they were heated. For a simple ankle foot orthosis (AFO) the guards could work well to limit movement in the subjects ankle. It is unclear whether

the shin guards would work as well for an articulated AFO.

Disadvantages:

The biggest disadvantage to creating this mold was the shape of the shin guards and slipperiness of the mold. The fact that there were two guards needed to make one AFO would add extra work in the construction of a full AFO. In addition, the mold under the foot was a bit slippery, which could cause problems when the subject is walking.

Conclusion:

The thermoplastic could definitely be used to make a temporary orthotic. If a sheet is premade with the right indentations for folding and molding, this prototype could greatly decrease turnover time. The problem of the slipperiness could easily be eliminated with strategic placement of rubber heels.

4.1.2 Temporary Orthotic (Friendly Plastic)

The second prototype for a temporary orthotic that was developed was created from a material called "Friendly Plastic". This material can be purchased online in large quantities. The Friendly Plastic consists of small beads, which are mixed with warm water. Once these beads melt in the water, a gel is produced which can be formed in any way. Once this material cools, it hardens into a plastic.

For this orthotic, we began by heating the water and and adding out beads to create out gel. While the gel was prepared, the subject's arm was prepared for the application of the gel. In order to ensure that the subject was not burned, a stockinette was placed on their arm. Once the gel was ready, it was slowly applied onto the arm. The group tried to maintain an even distribution of the gel across the arm to achieve the best results possible. Once all the necessary gel was applied, the group waited approximately 30 minutes for the friendly plastic to cool. Once the material cooled, we had the mold for our subjects arm.

Advantages:

The advantage of using the friendly plastic to make our temporary orthotic was the ability to manipulate the material any way we wanted. This provides a little more flexibility with the creation of the mold as opposed to the limitations of the shin guards.

Disadvantages:

There were several disadvantages to using the friendly plastic. First, the gel was quite hot during application on the subject's arm. This could obviously cause some discomfort when trying to create the mold. In addition, the mold was not as aesthetically pleasing due to the variation in thickness. This is largely due to the freeform application of the gel.

Conclusion:

While the friendly plastic was a little easier to mold, it was also a little messier of a process. It's possible that some of the issues with the process could be eliminated. The discomfort caused by the temperature of the gel could be eliminated through the application of more stockinettes. Also, the aesthetics of the hardened plastic could be improved if the mold is sanded to eliminate rough edges. However, this would mean more time spent to create the mold, which would defeat the purpose of having a temporary mold.

4.1.3 Central Fabrication

The third objective of the technical team was to understand all technical aspects of the Central Fabrication program. Considering none of our members had any previous experience working with orthotics and prosthetics, this was very important. The technical team researched the different types of orthoses available to patients, specifically for the lower limb. From this information, the technical team was able to assist the business team in developing a product line for the business model.

The orthosis that would be used for the model was the knee ankle foot orthosis (KAFO). This became the orthosis for the model because it is one of the most commonly used devices in Llatin America. The knee ankle foot orthosis spans the knee, ankle, and foot of the patient. The orthosis is used to stabilize the joints and assist the muscles of the leg that may be weak. There are several ailments that can cause a person to need a KAFO including: poliomyelitis, Muscular dystrophy, Mutiple schlerosis, spinal cord injury.

4.2 Business

4.2.1 Company Description

Centro Don Bosco (CDB) is a technical institute that gives underprivileged children of Colombia an education. Centro Don Bosco was founded in 1957 and became a school in 1958. It is a technical institute that teaches the marginalized and underprivileged a trade and occupation. The objectives of Centro Don Bosco are "-reaffirm the option for the poor (the youth and marginalized sectors), -generate the learning processes that permit them to take on with responsibility a sense of belonging and identity with the institution of all and of each one of the members of the educative community, -promote the integration of all the classes that make up our educative community, establishing the guidelines for this, that regulate the coexistence, in order to achieve an environment of harmony that enables the development of the pedagogical processes" (Centro Don Bosco).

The Category III program, of technical training for orthotics and prosthetics, was begun in February 2005 at Centro Don Bosco in Bogotá Colombia. It is the only Category III program in Latin America. This program is essential to Colombia due to the violence and armed conflict that occurs within the country. Colombia has one of the highest percentages in the world for land mine injuries.

While Centro Don Bosco is the only location in Latin America with a category III technician program they remain underfunded both in equipment as well as in funds to provide for students. Many of the CDB students are unable to provide the entire amount asked in tuition. A manner in which CDB would be able to raise funds in which they could provide financial aid for students as well as improve the equipment is to create a work-study program. A work-study program will provide experience for the students as well as funding for the school.

4.2.2 Organization and Management

Centro Don Bosco, a Catholic Technical High School in Bogotá, Colombia supports an important vocational program to train entry-level Orthotics and Prosthetics (O & P) practitioners of all financial backgrounds. The school works with families and donors to overcome tuition issues, and insure the program is affordable by all. Students at the Illinois Institute of Technology in Chicago, IL are working on the framework of a work-study training program to expand the program, and increase hands-on training experience. Students will work with their certified teacher to create basic O & P products of professional quality. In an effort to streamline the process, the program will follow a central fabrication model and produce shelf ready parts. Upon customer order, these items can be assembled with finishing touches. Working with a clinic, these items will likely be of lower cost or charity basis for those willing to wait longer. As a result, income from the sale of fabricated parts and services will assist in providing training facilities, including minimum wage pay for the students.

4.2.3 Structure

4.2.3 Ownership

Owned by: Centro Don Bosco Technical Secondary School

4.2.4 Management Profiles

Director of School:

Responsible for work-study program operation, and general funding, including revenue produced from student's work. May have the power to negotiate wages, as decided by school.

Class I or II O & P Professional:

This experienced professional has the responsibility of managing day-to-day operations of the work-shop, educational experience, and Quality Control. Education and quality of work/ products are the cornerstones of this program. Important quality checks should be made daily on student's work to provide a top quality O & P product regardless for charity or high paying customer. All review should be in the presence of students, so they may learn new techniques for dealing with challenges.

Teaching Assistant:

A recently graduated student can work as a teaching assistant to assist the O & P professional in their duties. Also should advocate for student needs with those above.

Work-Shop Manager:

This person is responsible for ensuring that there are working facilities, repair and maintenance of machines/ tools and allocation of project space. With coordination of Director of School, students could spend a percentage of time assisting the Work-Shop manager in cleaning, and maintenance duties on a daily and weekly basis.

Work-Study Students:

For many students, this first job experience should be a professional one. They will be responsible for learning how to manufacture O & P products under a central fabrication set-up. Clean-up of work-space will be their responsibility as well. Student issues should be brought to the Teaching Assistant first.

4.3.5 Marketing and Sales Strategy

1. Marketing is the process of creating customers.

2. Research is the foundation of marketing:

- Who are my customers and potential customers?

- Where do they live?

- Are we offering the kinds of goods or services they want at the best place, at the best time, and in the right amounts?

- Are my prices consistent with what buyers view as the product's value?

3. Creating a marketing strategy.

- Identify customer groups you can best serve

- Understand Customer needs.

- Always consider change.

4. A marketing strategy built with the following 4 P's:

- pricing

-production

-products

-place

4.3 Impact

The goal of Impact was to sustain the program. To be able to do this we divided our analysis and our results included Methods to promote Social Awareness, Market Analysis and option of telemedicine for various clinics.

4.3.1 Social Awareness

The goal of social awareness is to provide a comprehensive list of organizations with a common goal concerning the advancement and public awareness of the need for specialized care in the Latin American region of the world, specifically, orthotic and prosthetic fitting and rehabilitation to areas lacking economic or financial resources. Overall, there are approximately 25 large non-profit organizations who concentrate primarily in Latin America and South America. These organizations rely primarily on donations to fund their efforts. Common donations take the form of financial assistance, equipment, volunteers, materials and O&P components. This model fundamentally limits the amount of interaction between these organizations and the people they are attempting to aide.

In the US, most orthotic and prosthetic professionals enter the field because they, or a family member, have experienced a need for a O&P device. Other individuals who become O&P practitioners have usually worked in a related field of study, such as physical or occupational therapy. Through such experience, one may choose several branching pathways within the O&P community, such as a practitioner, technician, or pedortist.

While previous interest in this profession has been limited, the future anticipated demand for orthotic and prosthetic services is expected to increase dramatically.

The total number of persons with paralysis, deformity or other impairments that use orthoses is expected to reach 7.3 million by the year 2020.

The total number of persons with an amputation, and those using prosthesis, is expected to reach 2.4 million by the year 2020.

In 2007, 5,484 practitioners were certified by the American Board for Certification in Orthotics, Prosthetics & Pedorthics. Nearly 1,100 of these practitioners are 55 or older and likely to consider retirement within the next ten years.

It is estimated that approximately 1.9 million people in the US have had an amputation. More than 60 percent of non-traumatic lower- limb amputations are a result of diabetes.

The Centers for Disease Control and Prevention notes that arthritis is on the rise in America and projects that 67 million people will be afflicted by 2030. Orthoses are frequently used to stabilize joints, reduce pain and improve function in those suffering from arthritis.

As the Baby Boomer population ages, it is at great risk of back injuries and paralysis. These individuals will have an increasing need for orthotic services.

A present issue currently being addressed is the creation of cost-effective health care. The ability to provide the most cost-effective and clinically appropriate O&P care will be dependent on having a large enough population of well-educated, certified orthotists and prosthetists. Also, involving certified and licensed orthotists and prosthetists in reimbursement policy decisions regarding new

technological advancements will be cost-effective and enable individuals to have appropriate life-changing and life-enhancing O&P devices.

4.3.2 Telemedicine

There is a refugee camp in Barranquilla, Colombia, laden with $40,000 in medical and rehabilitation supplies and now thirteen local medical students who have volunteered to help. It has started with two students at 2004. There was a school build in this camp.. It is typical "third world": cement, wrought iron, no carpet or air conditioning. However, it adds an aura of stability and permanence to the makeshift construction of the one-room hovels squeezed into its shadow. It is more than a building: it is a monument to the future--testimony that there are people on the outside who believe there will be a future. There open structure that will someday serve as a lunch room--if the luxury of regular meals ever becomes a reality. The lunchroom without lunches is empty, except for a small class of children whose desks are bunched into a corner.

Uninvited visitors to our clinic in the refugee camp.

Colombia is full of people exactly like us, maybe even better. Perhaps a subtle form of conflict reveals the difference: the hearts and compassion of Colombians are just tested more often--no doubt, every day.

Debbie Plescia, CPO, is handling the orthotics and prosthetics for the team. Some patients are late because they must walk long distances. Others appear out of nowhere and hit the schedule like a bowling ball. Plescia never flinches, taking them as they come with a smile. Her only comments on the last day pertain to how overwhelming the job is. Despite this she's committed to returning as part of the solution.

Fittings are complicated by the prospect of a two- to three-month interruption in follow-up. Continuity of short-term rehabilitation scenarios and long-term objectives of the program necessitate networking among local talent. Marta Rojas of Laboratorio Ortopédico in Barranquilla volunteers her time and facility. Her two nephews accompany her as technicians. They constantly smile and jump at the opportunity to make any adjustments (which necessitate a ride across town to their laboratory)

Mr. Wulfran Palmer is fitted with a right BK prosthesis. His distal tibia protrudes two centimeters from the conjoined muscle and vascular bundle. It is a probable site of abrasion. In the US, the prosthetic evaluation would recommend an immediate revision. Not so here in Colombia. Surgery is simply not an option--yet.

These are basics hospitals/ university hospitals that showed interest in implementing a telemedicine program:

Hospital Pablo Tobon , Medellin , Colombia

Palmira Hospital , Valle, Colombia

National University Hospital , Bogota

Clanica Universitaria Teleta, Bogota

Hospital Infantil Universitario de San Jose, Bogota

Hospital San Juan de Dios, Bogota

Hospital Universitario del Valle, Cali

Hospital Universitario Fundacia Santa fe, Bogota

Hospital Universitario de la Samaritana (HUS), Bogota

Hospital Universitario San Ignacio (HUSI), Bogota

5.0 Conclusions and Recommendations

In this semester, what we feel we have established is an alpha retype for the business model and central fabrication. There needs to be more work done in revising and creating a beta prototype, with more testing and recommendation of the plan and model and research done. The major obstacle we faced as a team was to obtain the right data and learn proper techniques to obtain it. As a group we were inexperienced in this area which led to underestimation of the task. Our Faculty Advisor was able to guide us and point us to the right direction by providing presentations, articles, and a guide through our field trip to understand the methods of fabrication. Based on our understanding our team was able to do research to propose the recommendation of the model. However the orthotics and prosthetics education in developing country, especially Latin America, is in need of a revolution. There is still only thirty five percent getting the right aid. We in our own small way wanted to learn and create a difference and provide aid in any possible way.

6.0 Appendix

Appendix 1: IPRO 309 Budget

IPRO 309 Budget	Costs
Equipment for Technical Group	$500
Field Trips	$350
Photocopies/Computer Printing	$200
IPRO Day Presentation Supplies	$100
Total	$1150

Appendix 2: List of Team Members

Business Group	Technical Group	Impact Group
Francis Gotanco	Stephen Conover	Trevor Ashley
Adam Nizich	Alexander Mathai	Matt Claxton
Yong Park	Raul Vasquez Jr.	Monmayuri Ray
Kerry Quirk		

Appendix 3: Contact List

Name of the Entity	Centro Don Bosco
Name of Legal Representative	Padre Nicholas Rivera Penagos, SDB
	Padre Roberto Devia Rodriguez, SDB
Office	Provincial Treasurer
Address	Calle 36 #22-29 Bogota D.C. Colombia—South America Phone: (091)28834012/ 2883403 Fax: (091) 2872842
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Name of the Entity	**Bioconcepts**
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