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# Internationalization and Its Impact in Engineering Programs

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**Abstract** — In this Century life experience has a strong effect when it is about getting a job. It means that to have a good high education is not enough. The so-called global work market has become challenging due to the multicultural environment and the need of skills such as cultural understanding and for universities it has become on top of others another demand, which is to provide international academic experience for the students. So internationalization is now a strategic element to raise the quality of courses and as a result of some efforts raise the engineering students retention along the program. This paper has the goal to present and discusses the internationalization process of a university starting by the engineering programs that they offer. The objective is to make it more attractive and promote the double diploma in order to higher the quality of the programs.

**Keywords** — *international cooperation; double diploma; strategic plans; multicultural skills; development opportunities.*

## I. INTRODUCTION

Internationalization constitutes now an interesting way that universities, in several countries can obtain a great amount of financial support from education development agencies for the growth of teaching, research and extension. University Schools find in international cooperation programs an increase of competence in the development of their historical, educational and social missions.

Internationalization of any School no matter the program is important once it enriches the students' horizons and prepare them to be the next generation of leaders in their nations and who also can work in different cultures and countries to overcome challenges and so to cooperate in solving shared global problems.

The internationalization of higher education is a laborious process and demands a great deal of diplomacy and commitment to get to the final goal. Institutions worldwide are focusing on internationalization. As the process has grown in importance, so too has the variety and complexity of strategies and activities developed in order to get the goal. So, it's no surprise that student mobility and international research collaboration are the highest-priority among the internationalization activities.

Another aspect is the strong partnership that must be built among all the people from all involved institutions.

In many countries it constitutes of a plus and one way in which universities can retain and attract more students. Universities can find in international cooperation programs an increase of competence in the their development as educational institutions as well.

Under the current perspective the inter institutional international cooperation, in its essence, implies some fundamental conditions such as:

- to recognize the existence of people, protagonists of cooperation;
- all participants in the process should be involved and committed to the forms of cooperation, in accordance with the availability of available human and financial resources;
- the goals of cooperation have to be clearly defined and consistent with implementation strategies;
- projects should be included in the strategic development plans of the institutions optimizing the benefits and improving the levels of development of the partners;
- the activities must be specifically established, respecting previously defined schedules and budgets;
- and, finally, it is important the establishment of mechanisms directed to the development and evaluation of cooperation actions [1].

The establishment of internationalization strategies requires the observation of some characteristics that may limit the area of activity, such as: restrictions in terms of geographical location of partner universities; existence of language barriers; areas of excellence in teaching or research, as well as the level of development of the country where the institution is located. However Europe is a strong focus for most regions. Because of its history, diversity of regions and languages besides the glamour of old world.

In many ways the internationalization of higher education strengthens its academic programs but also benefits the countries economy, enhances cultural understanding, and

ultimately leads to a better future for the globalized world in which we live and will live [2].

The objective of the proposed project is to make the programs more attractive and promote the double diploma in order to higher the quality of them. It has been developed for a private university that sees the internationalization as an opportunity not only to higher the quality of its programs but also to attract more brilliant students aiming the further expansion of scientific research that is now modest.

## II. RELATION OF CONTEMPORARY EDUCATION AND WORK MARKET

Many newly trained engineers do not always have the skills they need to succeed upon completion of the course. Several studies show that, on average, 40% of young graduates worldwide do not have the skills to make appropriate decisions outside of the university environment in which they have spent 4 or 5 years.

The problem may arise from different environments: - On one hand, the highly structured environment of educational programs, and on the other, the changing, dynamic and challenging modern working environment.

The academic environment by its structuring characteristics needs to have schedules and study guides, and followed by the students for the construction of the knowledge and that should be taken seriously. But in the workplace as professionals the success implies in their capability to be creative, innovative and adaptable. In other words, newly trained professionals are losing the skills needed to adapt to the workplace, where the tasks to be performed cannot simply be learned in a textbook for a semester. Thus, it can be said that the so-called "soft" skills, in turn, are obtained as a derivative of how students actually learn, but not exactly what they learn.

One way to improve this transition from the academic environment and the work environment is to modernize the students' curriculum. Nowadays there are harsh criticisms of the teaching methods that lead the professional to a long period of adaptation. However, there has to be a starting point that can start a new academic journey that allows students to acquire the necessary skills needed for a short adaptation to the job market [3].

Another aspect is related to the governments that need to invest in the entire educational system, which builds workforce skills, since the basic education until the university levels. It is up to public and private institutions initiatives to offer opportunities for young ambitious talented professionals, who can cooperate for a better future of generations to come. Still there is no better place than universities to offer these opportunities, pushed by the enterprises collaboration offering internships opportunities.

Lately it is noticeable that the global growth of transnational education in the last decades has been one of the defining points of international education and has had significant impact on both host institutions and provider institutions.

One of the most notable features of this development has been its global nature, with new host and provider countries emerging. This has resulted in a much greater choice and increased access to an international education program for students, but also in more complexity.

It is important for nations to train highly skilled native-born citizens as well as to attract highly skilled immigrants in order to be competitive in a global scale and assure a future for the humanity.

## III. THE PROJECT

To understand the relevance between school disciplines and how a career building journey takes place, it is helpful for young people to understand how work dynamics work. The ability to make connections between one skill set and another set of skills is the basis of the development of the future engineer's career plan. This is what young graduates will do for the rest of their lives as they progress in their own careers. Developing a successful career requires that they continually ask themselves, "Where can I go from here with my current skills? - Given my vision and skill set today, what additional skills will increase my ability to achieve my vision? " The role of the engineering school also includes helping them to initiate this process of questioning, already during their formation hence the importance of a good engineering course.

Engineering courses actually are full of important core subjects that enables the students to develop their professional careers as engineers, however it is necessary to innovate and find ways to embed the curricula with important topics to fulfill the new requirements of what is called global world trends.

Engineering skills are internationally portable, leading to international mobility, which makes the profession extremely interesting. Intercultural skills, knowledge of languages and cultural prejudice management are very important also, because opportunities are extra boundaries and it is important to be able to adapt to any different cultural environment [4].

Another fact, which is not new, is that many engineering students have a lack of knowledge about what being an engineer really means. The first 3 years are particularly intense and hard. The authors of the project suggest that a possible way to improve their perception about the profession is to implement a new kind of course, more enticing and dynamic.

This is one of the proposals of COPEC's engineering education research team: - to embed a course with a more interesting activity for students, sooner, in the first year. It is a short-term workshop in order to show students the possibilities of performing as engineers in a global environment – a project developed for a private university in order to reduce retention rate among students of engineering courses. It is part of the internationalization of the Engineering Program due to the need not only to raise the quality of the program as well as to start the internationalization process of the university that is the goal.

The main idea is during the first 3 months' period, in the second semester of the 1st. year, provide the students with different classes, which are more dynamic, due to the mix of

site visits, lectures, project proposals, travel period and project presentation.

It intends to be for sure a very dynamic experience that provides students a clear view of what it is to be an engineer and what are their possibilities for the future.

The main objective of this project proposal is to provide a sophisticated period to implement integrated environments for teaching/learning systems. The idea is to provide a way to reduce the evasion of engineering courses, showing a glimpse of what it is to be an engineer and to see that there are wide varieties of opportunities worldwide [5].

#### IV. COPEC - SCIENCE AND EDUCATION RESEARCH ORGANIZATION

This is an organization of about 18 years of existence a multi-disciplinary organization that is a leader on advance science and its application to the development of technology serving society. It started its activities sixteen years ago and since then this organization has made a major contribution to the development of science and education, working to increase the best practices in several research fields.

Integration activities promoted by COPEC provide a qualified coordination and building partnerships, because COPEC is an organization that brings together scientists who share the mission of promoting and developing science, technology and education.

The objectives of COPEC are to promote professionalism, integrity, competency, and education; foster research, improve practice and encourage collaboration in different fields of sciences.

Contents, tools and services provided by COPEC, through courses, publications and consultations, with national and international experts, contribute to the promotion of the professional who wants to be privy of new achievements and service of men to technology.

COPEC enjoys respect and recognition internationally characterized by the open discussion, the free exchange of ideas, respectful debate, and a commitment to rigorous inquiry. Its IIE – International Institute of Education – is a bold and resilient source of innovation in higher education [6].

#### V. THE PROJECT DESIGN

The starting point of this project development is the establishment of some actions in phases, in steps that leads to the goal of internationalize the Engineering College Programs in a first moment, followed by other programs that the University offers.

The Phases are:

Phases	Description
<b>1 - Conception</b>	At this stage, it is established the estimates of achievement, dates, allocated resources, establishment of guidelines and elaboration of project outlines are discussed. The product of this stage is the project design
<b>2 - Structuring</b>	This stage involves all the technical part and activities necessary for the accomplishment of the

	project as: Hiring the operational team people; Basic schedule; Services to be contracted; Establishment of organization chart; among others. The product of this step is the entire action plan and timeline of final activities
<b>3 – Execution</b>	This stage consists of executing the project according to the action plan and timeline established between the stakeholders. The product of this step is the execution of all activities programmed in the project action plan.
<b>4 - Closure</b>	This stage consists of the closing of the project and the preparation of the reports with information about the project, with the necessary documents and documents to render accounts with the institutions involved in the project. The product of this step is the final report with the detailed description of all the actions of the project.

The Developed Activities are:

Terms	Activities
<b>Short</b>	<ul style="list-style-type: none"> <li>Establishment of an International Relations Office in Europe</li> <li>Identification of partners to establish agreements in Europe and USA</li> <li>Scheduling visits to partner universities</li> </ul>
<b>Mid</b>	<ul style="list-style-type: none"> <li>Short-term courses outside the country for undergraduate, graduate and high school students</li> <li>Agreements with universities in Europe, USA, and Canada</li> <li>Implementation of top pioneer courses with unique characteristics *1</li> </ul>
<b>Long</b>	<ul style="list-style-type: none"> <li>Courses offered with double diploma</li> <li>International Courses</li> <li>Exchange of students and teachers</li> <li>Receiving students from outside *2</li> <li>Opening of the advanced campus in Europe</li> </ul>

\*1 - The creation and offer Cyber Security Course on 3 different levels:

- High school;
  - University under graduation;
  - Graduation.
- Short international courses for:
- Specialization;
  - University Graduation;
  - Executive MBA;
  - Specialization Course for Engineering Teachers - International Engineering Educator.

\*2 -Focus on receiving students from CPLP - Community of Portuguese Language Countries component countries

About the agreements with other universities, they are the umbrella type with several possibilities such as student and teacher exchange, project development, double enrollment and others stipulated by the colleges involved [7].

It is important to start in Europe for several reasons, as follows:

- the main one being the visa exemption for citizens;

- the second one Europe has a very high level of cultural life;
- depending on time of the year, depending on the season, the flying tickets have a more reasonable price.

It is important to go to Canadian universities and US as well. The perspective is to offer:

1. Short courses;
2. Workshops;
3. Joint projects and courses.

The last accomplishment will be the establishment of an advanced Campus of the University in Europe once it is a very important economic block besides the fact that there is the Portuguese Speaking Country – Portugal considered one of the most important colonizer countries in the world history.

## VI. UNIVERSITY INTERNATIONALIZATION IMPLICATIONS

It is a fact that here is no right or wrong approach to entering the international educational market. Different circumstances will be prevalent in different countries and for different cultures. In all cases, COPEC's engineering education research team strongly recommends serious reflection and much preparation.

It requires a research on foreign property acquisition as well as understanding the real estate culture of the chosen country. By taking the courses abroad, universities are replicating their educational models to another set of circumstances, a different place and culture, with a different job market, demands, needs, and expectations.

The question is: is it worth it?

And the answer is: absolutely.

If institutions strive for success there is a fundamental action that is to seek the help of natives and professionals. Becoming international or even global can be one of the most intelligent and profitable moves to improve the quality of the organization, attract new talent and increase its resources whether human or financial. Otherwise, institutions would be neglecting increasing quality of education, acquiring new knowledge and experience and, more importantly, more opportunities for research development [8].

## VII. STUDENTS PERSONAL INTERNATIONALIZATION IMPLICATIONS

Internationalization is a necessary means of “self-transformation”. Contact with international students enables people to see the world from vantage points that reach beyond their own backgrounds – and this allows them to learn about new cultures and countries.

Although for many universities the needs of international students are for monetary reasons too, however universities will bring longer-term ethical and intellectual considerations to bear on the profit motive.

Successful courses and schools internationalization means to provide students the opportunity to approach their own cultures, texts, and traditions in different ways and through comparative perspectives. This is a process through which all involved are transformed, and compelled to think differently about their own traditions.

Internationalization is a project with an agenda with intellectual implications. It gives students and scholars the opportunity – and indeed the pressure – to view themselves and their cultures in new ways.

Universities must invest in the economic agenda of internationalization being prepared to embrace its intellectual consequences; otherwise they can embark in a doomed project. And so for universities to fully internationalize themselves, it is clear that they must look to internationalize their fellow professionals, the teachers and staff first [9].

## VIII. FINAL CONSIDERATIONS

For professional careers many employers states that no skill is more valuable than a foreign language. Many consider English as the “lingua franca”. English as a medium of instruction is a prevalent way to offer international higher education as it continues to attract international students. English-taught degree programs continue to develop in many countries worldwide. With the multilingual environment come new challenges and responsibilities. Although the continued prominence of English is uncertain English continues to play an important role in international higher education as well as in work places [10].

People are considered literate when s/he speaks the mother tongue, English and another foreign language. So the first positive aspect of an experience abroad is the learning of another language besides English.

People living abroad learn foreign languages or get particularly interested in foreign cultures, and it is likely that sooner or later they will be interested in seeing if the internationalization opportunities of their career would be appropriate for their lives. In academic environment international travels not only for teachers, but also for the students promotes the enrichment of the academic experience. And this attracts more young people to pursuing a career that involves college or university education.

Currently students seek for a university program considering more aspects than just the brand, ranking level and reputation of an institution. They consider the quality and value, including costs, career prospects, and student experiences of the institution, all aspects that have increasingly become important in the student choice process. The different opportunities that the university can provide is also important and study abroad is one of them.

In general students not only from abroad, they all seek out valuable quality experiences, anything from feeling welcome on campus, to accessible and valuable career services and to student accommodations. Higher education institutions shall continue to focus on creating and nurturing quality student

experiences with the aim of retaining students national or international.

As expected the future of higher education will continue to be shaped and changed by global phenomenon. With evolution, come opportunities and challenges so keeping track of global higher education trends allows education institutions to be one step ahead and plan accordingly for the future.

The internationalization project comes as an answer for the university that currently feels the need fostered by the incentives of governmental agencies as well as a way to attract more bright students and be at the top ranking. So far the organized actions that have been put in place are the agreements with universities abroad and a workshop in Europe for a group of students of the Civil Engineering Program.

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