Will the five-year engineering degree survive in Argentina?

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***Abstract* - Traditionally the length of the engineering careers has been six or five years in Argentina. From the first degree granted in 1870 the universities adopted the scheme of continental Europe, specially taking into account Spain, France and Italy. If five years or six were necessary, is on what people disagree. But now all the countries in Europe have changed to 3+2 or 4+1 due to the Bologna agreement. And also, the Washington Accord (Australia, Canada, Hong Kong, Ireland, New Zealand, South Africa, United Kingdom and United States) confirmed the Bachelor and Master scheme. This leaves most of the Latin-American countries as the only ones with a five-year degree. Several meetings have been held in the initiative "Ingeniería para las Américas" searching for a unified criteria. Argentina belongs to the MERCOSUR, with Brazil, Uruguay, Paraguay and Venezuela as full members and Chile and Bolivia as associated members. Brazil already has a 4+1 scheme. So it is easy to forecast that in less than ten years, an agreement for a 3+2 or 4+1 will be drawn first at MERCOSUR level and after that, extended the whole hemisphere. In Argentina the change is not very popular.Professionals associations are against it and also radical students. Pro and against arguments are included.**

Index Terms – engineering degrees, five-year degree, two-cycle degree.

INTRODUCTION

In the last twenty years significant changes have taken place in the engineering careers. Particularly the Bologna agreement [1] modified the structure and length of the curricula, with the aim in producing a unified structure of the curricula. Also the Washington agreement [2] has reaffirmed the two level schemes in most European countries.

In this presentation we analyze the impact of these agreements in Argentina.

We begin by including a. resume of the evolution in Argentina of the engineering careers. Then the different aspects of university institutions that might influence the decision on length of the careers are outlined.

ENGINEERING DEGREES CURRICULA EVOLUTION

The engineering careers in Argentina have followed the continental European format.

The first courses in engineering began in the University of Buenos Aires (founded in 1821) in 1865 with the first degree granted in 1870. The first professors were mostly of Italian origin, from the universities of Milano, Parma and Torino. The university followed closely a Napoleonic modelre. By 1900 there were three main universities in Argentina (Buenos Aires, Cordoba and La Plata) and all had engineering degrees with studies of five years and no intermediate degree.

The structure of the degrees has not greatly changed since, but instead, and gradually, new specialties were added.

At present Argentina has 38 national universities, 6 federal institutes and 1 province university, all sustained by state funding, and 41 private universities and 12 private institutes. Table 1 shows the amount of institutions that have had engineering degrees, with 67 (68.4%) of 98.

Usually each institution has more than one degree, at present:

- In national universities 287
- In national institutes 14
- In private universities 83
- In private institutes 7

  For a total of 391 degrees.

The last reforms include in many cases an individual thesis so that with five-year curricula the degree is equivalent to a Master. In some institutions it is mandatory and in others the student may chose between the thesis or a project.

	National universities	National Institutes	Private universities	Private institutes	Province universities	Total
total	38	6	41	12	1	98
With engineering	34	4	27	2	0	67
Without engineering	4	2	14	10	1	31

Table 1 amount of institutions with engineering degrees.

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INTERNATIONAL AGREEMENTS

Several agreements have been made to recognize universities degrees between countries, as the Montevideo Accord "Convention over professional practice" (Convención sobre el Ejercicio de Profesiones Liberales) between Latin-American countries in 1889. But in the last years not only the recognition of the degrees has been sought but also the possibility to interchange students at all levels of university education. This trend started at the same time that the two important agreements have been reached at Bologna, [3], and Washington [4]. Turning to Iberoamerica the agreements are being reached in the Mercosur and the Pacto Andino between governments, and at the institution level in the ASIBEI (Iberoamerican Association of Education Engineering Institutions).

The fundamental issues in the Bologna Agreement may be resumed as follows:

- Adoption of a system of easily readable and comparable degrees,
- Adoption of a system essentially based on two main cycles, undergraduate and graduate.
- Establishment of the system of credits – such as ECTS system – as a proper means of promoting the most widespread student mobility.
- Promotion of mobility by overcoming obstacles to the effective exercise of free movement
- Promotion of European co-operation in quality assurance with a view to develop comparable criteria and methodologies
- Promotion of the necessary European dimensions in higher education, particularly with regards to curricular development, inter-institutional co-operation, mobility schemes and integrated programs of study, training and research

The Bologna agreement compromises then not only a two main cycle system but also a whole integrated system to allow the interchange of students. As a result most of European countries are committed to the two-cycle system.

The Washington agreement "Recognition of equivalency of accredited engineering education programs leading to the engineering degree" states:

- Accreditation of engineering academic programs is a key foundation for the practice of engineering at the professional level.
- Accept the substantial equivalence of engineering academic programs accredited by the signatories to this agreement.
- The Accord applies only to accreditations conducted by the signatories within their respective national or territorial boundaries.

This agreement is more restricted than the Bologna agreement but involves most of the countries of the first world that do not belong to the Bologna agreement: Australia, Canada, Hong Kong, Ireland, New Zealand, South Africa, United Kingdom and United States

Argentina is part of MERCOSUR, with Brazil, Uruguay, Paraguay and Venezuela (recently incorporated); with Chile and Bolivia as associated countries. Exchange and cooperation in educational matters protocols have been signed but none is comparable to the Bologna agreement. Brazil has already adopted a 4+1 scheme.

At non-governmental level there is the Engineering for the Americas initiative [5].

FIVE-YEAR CYCLE VERSUS TWO LEVELS

The argentine university community, during the last quarter of the past century, has been busy with local worries while the world was going through an important progress regarding technical education. In all the central countries there has been a generalized concern in keeping up with the technology globalization process. The globalization of knowledge, the relocation of factories all around the world and particularly the growth of the electronic industry in the Asian southwest, among others, have been subjects which generated a review of the education of engineers for the twenty first century.

In Argentina, as in other Latin-American countries, the main concern in the 80's decade was the reconstruction of universities after the military processes of the precedent decades, and the "democratizaciòn" understood as facilitating the access to university studies to a larger part of the population. The 90's decade produced a different phenomenon. Economic policies included a fixed rate of exchange of the local currency with respect to the US dollar, which was successful in controlling chronical inflation, but resulted in favouring imports and discouraging local production and development. This situation had an impact on the engineering courses, resulting in a diminished demand for graduates, and ailing stimulus for stronger academic requirements. Therefore updating of teaching in engineering lost priority

At present, and as a consequence of the above, when a renewal of syllabus is proposed, the effort needed is substantial since the resistances that have to be overcome are many, because of the need to face in a short time what in other countries was achieved gradually in time.

In addition to these problems, we have to consider the conflict between the traditional scheme and the two cycle curricula. Focusing on this matter we find that the debate on the adoption of one or the other plan has been going on for years, since independently of all the arguments given above, changes are always difficult to implement. Therefore the one cycle scheme has been maintained until now.

Nevertheless we foresee that this will change rapidly, not so much because of conviction of the local actors, but by the imposition of the international environment. Those who have traditionally opposed the two cycle scheme have always associated it with the North-American- British scheme, with

its Bachelor/Master/PhD levels as opposed to the scheme in European countries, thus "aligning" themselves with the traditional European university teaching. In this context, the Bologna agreement, which amongst other subjects defines a two cycle scheme, leaves Argentina, together with some other Latin-American, with their models in an isolated and difficult to sustain position.

The professional associations of engineers have a marked preference for the single cycle scheme of five years.

Although there has been no public definition in this sense, the professional sector has shown no enthusiasm for the two cycle scheme.

We can understand the resistance to this scheme if we consider that in Argentina, as in other Latin-American countries, the university degree obtained and not an external examination is the qualification for professional practice.

In this context, a generalized opinion is that the two-cycle scheme (4+1, 3+2) will be the source of new generations of engineers with MSc. level. As currently those who studied for the masters degree, did so after obtaining an engineering degree, it is feared that the traditional (already obtained) engineering degrees will be assimilated to the qualifications of those who complete the first four or three year cycle. From this point of view, this would mean, in their view, an immediate virtual "devaluation" of their professional degree for a great majority of engineers.

We can here see a conflict between two ways of assessing the effects of globalization in the field of engineering teaching.

On one side, a globalization in everything related to bringing up to date syllabus, contents and teaching methods; at the same time a more local and antiglobalization attitude regarding the professional degree.

UNIVERSITY CONSTRAINTS

For many years all the universities in Argentina were public. In 1958 a fundamental change was made allowing privately owned universities. As in other similar events, not without students unrest; with for and against demonstrations, In several occasions with quarrels and fighting. As from that moment on it became possible to have private universities in addition to state universities (depending from the federal government or from a province).

Since more than fifty years now, in Argentina, the state universities are free of charges and fees for undergraduate students including foreigners. In 1994 an amendment to the Argentine Constitution was approved to that effect, art 75, inc 19 [3].

It included another fundamental change: autonomy of the state universities was granted as a constitutional privilege. The universities decide their statute and may modify it, select the governing form and elect all the authorities, manage their goods, possessions and resources, create the different degrees and careers, decide the curricula, conduct their research and extension; grant diplomas, decide the ways to enter the university, hire the personnel, etc.

The government of the state universities has been a controversial issue in Argentina. One of the most important events took place in 1918, the University Reform ("Reforma Universitaria") [4] when the students demanded participation in the government, and in the election of university authorities together with autonomy from the government. With different stages the evolution ended in a complete autonomy for the universities. After December 1983, with the return to constitutional rule, and as the previous military government had changed authorities of the universities, fired professors and employees, instituted an entrance examination and numerus clausius, a strong movement began to claim complete autonomy. The entrance restrictions werw considered as a limitation to the students and as a consequence of this, and in order to ensure the level of the new students, a Common Basic Cycle (Ciclo Básico Común) was created in 1985, in the University of Buenos Aires, which has a massive attendance

In the present the universities and equivalent institutions are regulated by the national law Nº 24521 –Ley de Educación Superior– that was approved in august of 1995.

The University of Buenos Aires has challenged parts of the law as unconstitutional in courts of law and has been partially given reason.. Because of this, for the UBA, it is not mandatory to sit for accreditation in the Accreditation University Studies Board.

In the specific case of the University of Buenos Aires, it is possible, that due to some resistance from student and professional groups, the five year cycle will be maintained for some time, before the new trend is fully accepted.

CONCLUSIONS

Our impression is that the advantages of a system agreed with the other Latin-American countries and a shared degree program will, in a short time, be installed as a two-cycle scheme, by means of MERCOSUR level agreements. But not without a certain degree of opposition.

With regard to all this, the influence of the Bologna agreements has been decisive in creating the climate proper for a university scheme that goes beyond national frames.

It is to be expected, that as far as concrete and measurable results are produced, this influence will increase.

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