

The Ibero-American Engineer: An ASIBEI Project on Global Education

**Rafael Quevedo-Camacho¹, Juan Manuel Ramírez-Cortés²,
Mario Gómez-Mejía³**

1. Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería (ASIBEI); President / 2. Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería (ASIBEI); Past President / 3. Asociación Nacional de Facultades y Escuelas de Ingeniería (ANFEI); Executive Director

Abstract

The importance of recognizing engineers in American and Iberian-American countries is discussed. The Ibero-American Association of Engineering Schools (ASIBEI), has been working on the concept of the “Ibero-American Engineer.” In this paper, the authors discuss the characteristics that a professional would need to demonstrate in order to be considered in that classification, as well as the ideal knowledge, abilities, and attitudes required in the modern world, toward a global degree recognition. Iberian-American countries have concluded that the concept of an American engineer, and that of an Ibero-American engineer, are similar. It is agreed that cultural, economic, social, and political situations must be taken into consideration, in addition to the academic and technical development of each individual country.

Introduction

The globalization of the economy is resulting in ever-increasing border openness. Technological development is one of the primary detonators of this globalization, and engineering has been the main drive behind technological development. This situation has caused engineering professionals from all over the world to seek to identify themselves, as collaborative projects between engineers of different nationalities become more and more common.

For several years, American and Iberian-American countries have been carrying out studies exploring this topic. In the ASEE and ASIBEI, one of the primary tasks has been to establish definitions of the American and the Iberian-American engineer.

Antecedents

America and Iberia-America have many aspects in common; when one speaks of America, it is usually understood as a reference to all American (Western Hemisphere) countries. With regards to cultural and ethnic origins, nearly all areas share a European ancestry, but we may identify two major categories: Latin American and Anglo-Saxon. With regards to language, Spanish is spoken in most American countries, English is the second-most widely-spoken, and is followed by

Portuguese and French. Higher education follows two major trends – the Anglo-Saxon tradition, and the French tradition, with the latter being dominant in Latin American universities.

The Ibero-American Engineer

Since its founding in 1997, ASIBEI has focused its attention on the concept of the Ibero-American engineer, with the hope of establishing a common definition of an engineer that can be applied in all Iberian-American nations, regardless of an individual's home country. Such a definition could act as a professional agreement between countries.

The ASIBEI recognizes that in order to formulate an adequate definition, it is first necessary to evaluate each country's engineering programs, considering curricular guidelines, accreditation systems, and certification procedures.

It is understood that curricular guidelines and accreditation are highly interrelated. The Iberian-American countries that have accreditation systems also have very well-defined curricular guidelines, including areas on curricular contents, thematic areas, study duration, and credit units, among other considerations.

The ASIBEI, through several forums, has established the following recommendations for curricular guidelines:

- Strengthen national accreditation processes and advance towards international accreditation recognition.
- Define the characteristics of the Ibero-American engineer, possibly using principles established by the UNESCO or the Declaration of Bologna as guidelines.
- Analyze and standardize the variety of titles awarded to engineers.

The ASIBEI has also concluded that:

- Not all Latin American countries have defined curricular guidelines; in some cases, guidelines have been elaborated in order to conform with government mandates.
- Existing curricular guidelines have been adopted thanks to national accreditation processes.
- General characteristics do not vary substantially among countries.
- There is a uniform trend in all countries to apply the following program divisions: basic sciences, engineering science, applied engineering, social sciences and humanities, and electives.
- It is important to create a definition of the desirable characteristics of an engineer and then apply this definition to develop “substantially equivalent” criteria to facilitate multinational and multiregional efforts.
- The standardization process should respect the diversity within each country.

Argentina, Colombia, Chile, Mexico and Venezuela stand out as the Iberian-American countries that have established accreditation processes in engineering education programs. The purpose behind the creation of these procedures was the same in all cases: the advancement of quality engineering education.

Some information about their accreditation processes:

- Most of the accreditation processes are voluntary.
- The accreditation entity is in some cases autonomous, and in others governmental.
- Latin American associations for engineering education have had substantial participation in the development of accreditation guidelines.
- In some countries, accreditation systems are continuously reviewed by academic peers.
- Measurement parameters are similar in all cases.
- Evaluation processes are carried out in a similar way: auto-evaluation, evaluation of academic peers, visits, and verdict.
- Accreditation validity varies between 5 and 6 years.

It is also noted that in some countries definitive agreements for the implementation of accreditation guidelines have still not been reached; in others, agreements have not been reached with the appropriate government institutions.

Profile of the Ibero-American Engineer

The profile of the Ibero-American Engineer has been defined taking into account the approaches that have been proposed at the international level, from the Grinter concept to the definitions accepted by the UNESCO and Bologna declarations. These efforts have taken into consideration such ideas as: the engineer of the new millennium, the competitive engineer, the pre-globalization engineer, etc.

Independently of the country, with very few variations it can be concluded that an engineer will have the following characteristics with regards to knowledge, abilities, and attitudes:

KNOWLEDGE

- Physics, mathematics, and chemistry
- Engineering science (in major field)
- Computer knowledge
- Project and administration evaluation
- The society in he/she will work or research

ABILITIES

- Apply knowledge to analyze and solve concrete problems
- Learn auto-didactically
- Observe, model, and interpret natural phenomena.
- Express knowledge in oral, written, and graphic forms; also in a foreign language (English)
- Create, innovate, assimilate, and adapt technology

ATTITUDES

- Solve engineering problems from a societal perspective
- Spirit of service
- Desire for continuing education
- Ethical values

- Participation in multidisciplinary groups
- Initiative and leadership

This is, in general, the profile that is wanted for the Ibero-American engineer. However, it does not differentiate him/her from an American or a European engineer. This definition can be applied to any engineer, anywhere in the world.

The Ibero-American engineer may also be characterized as possessing the following attributes:

ABILITIES

- Participate effectively with other cultural groups
- Interpret social, political, economic, and cultural phenomena of Iberian-American countries

ATTITUDES

- Willingness to participate and integrate him/herself in work groups with citizens of other countries, despite any ideological differences that may exist

The ASIBEI recognizes that strategies should be planned and carried out in order to reach the population of students, professors, and professionals in the Iberian-American region. Profiles for engineers from different branches will be defined, although the main considerations remain the same: program quality, solid foundations in basic and engineering sciences, language acquisition, communication abilities, and intercultural and teamworking skills.

Conclusions and Proposals

- The ASIBEI emphasizes that before attempting to compare the American engineer with the Iberian-American engineer, and to achieve a mutual recognition, it is first important to recognize the differences in engineering education among countries and work to reduce them, especially with regards to curricular guidelines and accreditation processes.
- It will be necessary to form international work teams composed of countries and universities who have a stake in reaching this mutual recognition of engineers.
- These work teams must analyze and contrast engineering education practices in each country represented on the team.
- It is important to evaluate how the system is changing from technical teaching to technical learning, as well as how new technologies are being used, and how educative processes are changing in general.
- The support of governments and university authorities is indispensable to the success of this project.
- Those countries that already have free-trade agreements will be the first to begin work on these proposals.
- The definition of an American engineer and an Iberian-American engineer must be on the agenda of the Summits of the Organization of American States and the Organization of Iberian-American States.

References

- III Encuentro Iberoamericano de Instituciones de Enseñanza de la Ingeniería, Proceedings, pp 199-220, December 2001. Rio de Janeiro, Brazil.
- J. Salazar Contreras, G. Forero Duarte, “Situación Actual de la Acreditación de Programas de Ingeniería en Iberoamérica”, Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería, Bogotá, Colombia, 2003.
- M.A. Sabrevila, “Cultura, Profesión y Acreditación del Ingeniero Iberoamericano”, Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería. Bogotá, Colombia. 2003.

Biographical Information

RAFAEL QUEVEDO-CAMACHO, Biochemical Engineer, president of Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería (ASIBEI), president of Asociación Nacional de Facultades y Escuelas de Ingeniería (ANFEI), México and dean of Instituto Tecnológico de Tijuana, México.

JUAN MANUEL RAMÍREZ-CORTÉS, Communications and Electronic Engineer, Mater Degree and Ph.D in Electronic, past president of Asociación Iberoamericana de Instituciones de Enseñanza de la Ingeniería (ASIBEI), dean of Escuela de Ingeniería, Universidad de las Américas Puebla, México.

MARIO GÓMEZ-MEJÍA, Civil Engineer, Master Degree Structures, executive director of Asociación Nacional de Facultades y Escuelas de Ingeniería, México. past dean of Facultad de Ingeniería, Universidad Autónoma de Yucatán, México.