Results of the National Accreditation of the Engineering Programs: The Experience of a Colombian University

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Abstract

In 1999, the Engineering School of Universidad del Norte, formed by the Civil Engineering, Electrical Engineering, Electronic Engineering, Mechanical Engineering, Industrial Engineering and Systems Engineering Programs achieved the first national accreditation of the Industrial Engineering Program. From then on, in 1999, 2000, 2004 and 2008, the accreditation of the Systems Engineering, Mechanical Engineering, Electronic Engineering and Electrical Engineering Programs was respectively attained. Accreditation is officially granted by the National Ministry of Education and it is an act of public recognition of the high quality levels achieved by the academic programs which voluntarily submit to the process. Accreditation is considered by Colombian universities, as one of the most important instruments for quality improvement of higher education.

The authors present the Colombian Accreditation System, the way the accreditation process was developed in the different Programs of the School, the motivation, the methodology used, the results obtained, the difficulties encountered along the process and the actions taken to solve them. Additionally, the impact of this process on the academic, research and social projection development in the programs is also analyzed, and the way this process is contributing to attaining international accreditation of the programs.

Keywords: Accreditation, quality improvement of higher education, curricular design

Introduction

One of the aspects that have allowed Uninorte to develop as an academic institution that offers high quality higher education studies, has been its commitment with institutional accreditation as well as that of its educational programs [1]. This commitment has also been assumed by the Engineering College and this is why currently (2009) all its programs are nationally accredited.

This paper presents a description of the Colombian Accreditation System for Education programs, the process developed by the Engineering College to obtain the accreditation of all its programs, and finally the results which have consequently brought the strengthening of the academia and research and the position of the college at national level, as well as its international projection.

I. National Accreditation System

In Colombia, education is a human right and a public service with a social function based on a Constitutional Law. It represents an access to knowledge, science, technology and other goods and values of culture [2]. For this reason, higher education is a cultural public service belonging to the social aims of the state. This constitutional right became a reality with Law 30 of 1992, which created the National Accreditation System for the institutions of higher education. It is formed by the National Council for Higher Education (CESU), which is an assessment organism of the Education Ministry, the National Accreditation Council (CNA), which evaluates and gives technical judgement on the quality of academic programs, the institutions of Higher Education which seek accreditation and the academic community (CNA) [2].

The main objective of the National Accreditation System is to guarantee society that academic programs and institutions of higher education which take part in it have reached the highest quality standards and develop the aims and

objectives they have declared to have (CNA).
The programs which reach the quality requirements established, are given high quality accreditation by the Ministry of Education, which is a public recognition based on the technical concept issued by National Accreditation Council (CNA).
The quality concept applied to the public service of higher education refers to a set of aspects that allow acknowledging a specific academic program or institution and giving a judgement about the relative distance between the ways that institution or academic program renders a service and the optimal corresponding to its nature. [3]
To approach this optimal point the National Accreditation Council has defined a set of general quality characteristics grouped in larger factors which express for the one part, the existing elements for the academic performance and for the other, the development of academic processes and the impact programs exert on their environment.
The factors defined are: Mission and Institutional Project, Students, Faculty, Academic Processes, Institutional Well-being, Organization, Management and Administration, Alumni and impact on the environment and physical and financial resources.
These factors are evaluated through their associated characteristics by the main stakeholders as are the students, faculty, authorities and administrative staff, alumni and employers using instruments such as surveys, interviews, focal groups, workshops and others [4].
With the aim to make visible the quality degree reached, some indicators or empirical referents have been defined. These, nevertheless are not mandatory since each program to be evaluated may define its own indicators. Indicators can be either quantitative or qualitative. Likewise, the CNA has formulated analysis systems for the quality and characteristics factors and programs can adopt them or define their own analysis according to the relative importance the factors and their associated characteristics have for the program.
In the Accreditation process, two aspects are considered: the first one is the quality evaluation developed by the institution itself and by external agents, and the second is the public acknowledgement of quality.

The evaluation consists of three steps:

1. Self-evaluation. It consists of a study developed by the academic program based on the criteria established by the CNA.
2. The External Evaluation or Pair Evaluation which uses the Self-evaluation as its starting point. It verifies results, identifies internal conditions of the program operation and gives a judgement about their quality.
3. Final Evaluation, which is developed by the CNA, using the results of the self-evaluation and the pair evaluation.

The public acknowledgement of quality is granted through the accreditation act, which is public and it is issued by the Ministry of Education based on the technical concept emitted by the CNA

II. The Accreditation Process in the Engineering School

1. Motivation

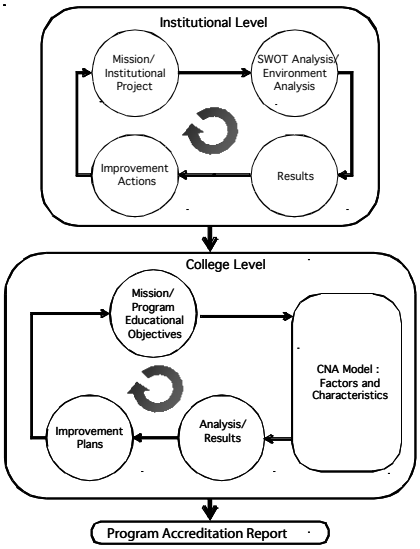
Among the most important reasons for submitting the engineering programs for accreditation are [5]:

- Commitment with academic excellence
- Rendering of accounts to society and the state concerning the educative service rendered in the engineering discipline.
- Verification of accomplishment of the Mission, aims and objectives of the institution and particularly those of each engineering program, and
- Consolidation of the self-evaluation process

2. Methodology followed for the program accreditation

A self-evaluation model has been developed, which is presented in Diagram 1. The engineering programs understand self-evaluation as a strategic study process essentially reflective, analytical and participative focused on change, where the criteria established for accreditation the process of programs and institutions are taken into account.

Diagram 1. General self-evaluation model



One can conclude from the above mentioned model that there is a consolidated self-evaluation culture at the institutional level as well as at the Engineering College. Two feedback cycles are observed: one at the institutional level and the other one for the Engineering College. Another aspect to be enhanced is the formulation of improvement plans for each program starting from the results of the External evaluation by pairs and their monitoring processes.

One of the main difficulties observed during the development of the process has been the evaluation of some of the characteristics which associated quantitative as well as qualitative indicators, given the fact that many of latter correspond to perceptions of the people who are involved in the process concerning the aspects that are being evaluated. In order to be able to handle this difficulty different data sources have been obtained and they are contrasted and finally an analysis of the characteristic taking into account both quantitative and qualitative results is developed.

Another aspect that has presented difficulty is the previous revision of the report before submitting it to the CNA on the part of the external pairs. In order to solve this situation we have asked the collaboration of academic pairs of our institution working for instances external to the Engineering College, but who have enough knowledge about the profession being evaluated and its curriculum.

3. Results

Currently there are 270 accredited engineering programs in Colombia of a total of approximately 1,000. The Uninorte Engineering College is the only college in the Colombian Caribbean Region with all its engineering programs accredited. This fact positions it as a regional leader and one of the most important at national level.

Among some of the strengths described by external evaluators which are common to all the evaluated programs are the following: A flexible curriculum, an adequate mechanism for academic recognition of faculty and students and coherence between decision taking and the institutional mission, a high commitment level of faculty, institutional authorities and students, a comfortable modern campus with an infrastructure ensuring a harmonious development of teaching, research and social projection.

Among the aspects for which the external evaluators had suggestions are the following: modernization of some specialized laboratories, low visibility of faculty intellectual production in some programs, low level of interaction of alumni, low level of participation of students and faculty in the decision of high level instances of the institution.

Taking into account the evaluation developed by the external pairs and the institution and Engineering College development plans, improvement plans for each program were developed. Some of the results produced by the execution of the improvement plans are listed below:

- Curricular modernization of all engineering programs taking into account the ABET Engineering Criteria
- Creation and operation of the alumni office
- Cutting edge updating of the engineering laboratories and acquisition of high performance servers.

- Design of the new engineering laboratory building, which will be constructed in 2010.
- Increment of the faculty publications at international level
- Creation and operation of mechanisms supporting the participation of faculty and students in the decisions taken at high level instances of the institution.
- More articulation between undergraduate and graduate divisions through the offering of in depth Master degrees in the areas of Industrial, Electronic, Mechanical and Systems Engineering and a PhD in Industrial Engineering.
- Increment of the number of full time faculty with PhD's.
- Programs internationalization through the establishment of agreements with universities abroad to offer double degrees.
- A curriculum in accordance with international standards and trends in order to educate engineers meeting the regional and national demand.

Table 1 shows the evolution from 2005 to 2008 of the indicators considered as the most representative of the advances towards academic excellence in the College. Continuous improvement is observed in indicators such as the number of faculty with PhD studies, the number of full-time faculty in the College, intellectual production including published articles and public lectures at national and international level and the name of students enrolled for research. This is the result of the formulation of a quality assurance system in the formation of Engineering students, where the recommendations of the CNA evaluators and international referents such as those of the ABET Engineering criteria 2000.

Table 1. Evolution of the most significant indicators for the division.

	2005	**2006**	**2007**	**2008**
Percentage of PhD degree faculty	31%	28%	41%	58%
Number of faculty undergoing PhD studies	18	18	27	23
Number of Full-time faculty	53	59	63	68
Number of articles published	17	24	26	32
Number of national lectures	6	16	28	31
Number of international lectures	35	20	40	35
Number of functioning students' study groups	7	7	7	8
Students training for research	17	16	21	17
Students' participation in research projects	5	14	20	18

Conclusions

The self-evaluation process for the accreditation of all the collage programs has allowed the strengthening of all the programs' academic, research and social and international projection processes. Curricular improvement supported by modern laboratory resources, computer and communications technologies, the increment of faculty holding PhD's and permanent mechanisms for evaluation and monitoring of the student education process have prepared the college to undergo the accreditation process with international agencies. For this reason, during the second semester of 2009, the college will receive the visit of the ABET agency to evaluate all the engineering programs of the institution.

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