Effects of the implementation of a self-assessment model in the accreditation of programs in Higher Education

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Abstract. The purpose of this article is to present the success of the Antonio de Arevalo University Foundation – Unitecnar, in the self-assessment process for undergraduate programs at the Faculty of Engineering Sciences, specifically the Technology in Systems program, describing the self-assessment model and the methodology applied in the program accreditation processes, which has resulted in three consecutive accreditation for the mentioned program. At present, the applied model has allowed the identification of strengths and aspects to be improved and the implementation of self-assessment and self-regulation processes in the different functional areas, from the generation of reflection spaces for a better contribution to the quality of the Administrative services and Academics, these excellent accreditation results have been obtained for nine (9) programs at the Unitecnar Faculty of Economics and Engineering Sciences.

1. Introduction

The National Accreditation Council - CNA (for its acronym in Spanish) is created by Law 30 of December 28, 1992, as an academic body, attached to the Ministry of National Education, with the main purpose of guaranteeing to the community that the Higher Education Institutions - IES (for its acronym in Spanish) will develop its educational function, offering programs with the highest criteria and quality standards [1].

The qualified registration system was installed in 2003, ten years later than the accreditation system. During this decade, the accreditation system was the only instrument for controlling the quality of higher education, but only for those institutions and programs that voluntarily accepted it. As of 2003, the qualified registration process was mandatory for all programs of this educational level [2].

The CNA defines Accreditation as a testimony given by the State regarding the quality of a program or institution based on a previous evaluation process, in which the institution, academic communities and the National Accreditation Council are involved, with the theme of the quality of higher education, some changes were introduced such as: the recognition of greater autonomy of educational institutions for the appointment of their highest managers and the creation of academic programs; the creation of a National Information System on Higher Education – SNIES to have information on educational offer and quality indicators of educational institutions; and, finally, the definition of a process of accreditation of educational institutions to guarantee students in particular and society in general that they meet the proposed objectives and the highest quality requirements [3].

The accreditation process is born initially, as a mechanism to strengthen the quality of Education and make a public recognition to the Institutions that will achieve high quality standards. In Colombia, as described by the CNA, the accreditation process does not arise within the framework of inspection and surveillance of the state, but in the promotion, recognition and continuous improvement of quality and
also recognizes that the main and most effective investment made in the context of accreditation, is not properly the implementation of the model itself and of its evaluative processes, but the investment in the application of institutional improvement plans and programs, which have been designed by the institutions as a requirement for their entry into the system or as a result of the self-assessment and reports of academic peers [4].

From the perspective of interest groups, accreditation fulfills an important social function. In the case of students, they require a quality system that guarantees the provision of an adequate educational service so that graduates are highly likely to obtain employment and thus improve their personal and social life, the interest of employers is have a system that ensures the training of trained human resources so that it can perform a specific occupation [5] and the interest for IES, is a process of self-assessment of all the Administrative and Academic functional areas that allows a continuous improvement.

This article describes the effects of the implementation of the Self-Assessment Process for accreditation purposes, of Unitecnar based on the guidelines of the CNA, applied in the Undergraduate programs of the Faculty of Engineering Sciences, specifically Technicians and Technicians of the Systems area, which begins in 2007 when Unitecnar attending the projected opportunities, in areas such as: custom software development, computer application testing, and software adaptation to local markets and sectors, also, with the progressive deployment of telecommunications infrastructures and the massification of broadband, and opportunities related to management and production technologies in the cloud, the evolution of the knowledge society, its digital environment and greater interconnection and interactivity [6], begins with the review of all its processes to identify its strengths and weaknesses in these programs, which allowed it to be inferred that the demand for digital security technologies would be increasing, which made it necessary to offer an academic program with high quality standards that will guarantee a comprehensive professional that meets With the needs of the market.

For Unitecnar the Accreditation process is the highest recognition given by the MEN (Ministry of National Education) to the quality of academic programs of IES, which comply with specific guidelines determined by the evaluating entity, with a rigorous monitoring process and continuous improvement [7].

2. Self-Assessment Model
Unitecnar carries out its self-assessment processes, for accreditation purposes following a self-assessment model created by the Institution, which is based on the CNA guidelines for accreditation of Undergraduate Programs, which involves each of the elements of the Evaluation [8]. It determines or describes the level of proximity (with respect to an ideal), with which the different activities offered by the program are executed and the degree of compliance (compared to the ideal) of them is evaluated. See figure 1.

![Figure 1. Unitecnar Self-Assessment Model.](image-url)
3. Methodology of Application of the Self-Assessment Model

The self-assessment process is operationalized through the application of the model in four (4) stages, which together show the results of the final process; these are: First Stage: Pre evaluation, Second Stage: Evaluation, Third Stage: Post evaluation and Fourth Stage: Follow-up to Improvement Actions. Each of them contains the components evaluated by the CNA and described in the document Guidelines for the accreditation of Undergraduate programs, which are detailed below:

First Stage: Pre evaluation: In the first stage, the sensitization and socialization is carried out to the academic community about the self-assessment process to be carried out, the Quality Conditions Analysis is performed, the quality factors are analyzed, the Characteristics and Aspects to evaluate. The criteria for assigning weighting factors are defined, the criteria for qualifying self-assessment results, Discussion of the operational component of the process, the criteria, goals and activities are established in the short, medium and long term, the Work committees by factors, teachers' cloisters, discussion meetings and conceptualization are held to unify criteria.

Second Stage: Evaluation: In the second stage, pilot tests are developed to validate instruments, Collection of information through survey techniques, interviews, workshops and information gathering, Numerical and documentary, Consolidation of the information collected, Analysis and interpretation of the information about compliance with the quality conditions in the Programs, Drafting the diagnostic report with the results of the self-assessment, Conducting seminars for the socialization of the Results of the self-assessment.

Third Stage: Post evaluation: In the third stage the analysis of the results is addressed in the different committees in the direction of the diagnosis of the conditions, Current and to the proposal of improvement proposals, Preparation of the Improvement Plan for the program, by the Technical Committee.

Fourth Stage: Follow-up to Improvement Actions: In the fourth stage, the actions contemplated in the Improvement Plans, Preparation of Follow-up Reports of the improvement actions set out in the Improvement, Program and Institution Plans are monitored.

The Self-Assessment model is executed in a harmonized manner with what is requested by the MEN education authority and is pertinent from the point of view of the needs of the Institution, in order to self-evaluate its processes it carries out activities to assess the satisfaction of its entire academic community through periodic consultations such as, surveys of students and teachers that are carried out in order to propose improvement actions that favor academic and institutional quality.

The control and monitoring systems of the improvement plans and the achievements associated with the institutional project and its development plans are evidenced through the follow-up reports to the improvement plans. Each and every one of the self-assessments carried out in the Office of the Vice-Rector for Institutional Quality aims to generate an improvement plan and maintenance plans that are then part of the plans of action of teachers of the institution's plant to follow up at different times to verify their compliance.

Because the application of the self-assessment model to a specific program or to the institution generates a certain amount of data that is difficult to handle manually, and that in addition the collection of information in the different stages of the model is a fairly complex process to carry out, made it necessary to use a computer tool to manage information, easily accessible, that would provide a fast and reliable process of all types of data, with storage capacity, work automation, interactivity and digitization of all information [9].

In response to the need to automate the execution of the self-assessment processes, SAIP for its acronym in Spanish for Institutional and Program Self-Assessment System was designed, developed and implemented. Since its inception, this system was conceived as a tool that greatly optimizes the operationalization of the application of the self-assessment model, managing in a better way the data and information that these processes handle, thus allowing the obtaining of results in a more efficient way. These self-assessments processes are necessary to request the accreditation and / or renewal accreditation of both a specific program and the institution before CNA. The whole system manages in
a more efficient way self-assessment processes, because executing them manually implies a significant expense in time, in human, physical and technological resources.

SAIP was developed web-oriented, using the PHP programming language, with the Code Igniter framework [10] and the data is managed through a database in PostgreSQL [11]. The implementation of this tool generates the following benefits:

- Ease to collect all the information necessary for the generation of reports. Through the system the documentary / numerical information, strengths and weaknesses are entered.
- Be able to use the system at any time and place for being oriented to the Web.
- Survey application to the different sources and evaluators through the web, without having to move from the institution's facilities.
- Follow-up to the evaluators, allowing to identify who has carried out the survey in a very detailed way.
- Generation of reports which constitute a valuable input when it comes to constructing the documents presented to the CNA and in the improvement plan.
- Effective treatment of information, since being centralized all the information that is handled, you can access it and make the queries that are required to obtain specific information.
- Reduction of resources such as: time, human talent, among others.

Currently this system consists of two software: SAIP-Administration and SAIP-Survey. In SAIP-Administration, the entire self-assessment process is managed. This is linked in the institutional application platform called SIA (for its acronym in Spanish) and only those users to the platform can access it, logging in with their username and password, as shown in the figure 2. Through this software the following processes are handled:

1. **General data management**: Record, update and eliminate factors, characteristics, indicators or aspects to evaluate, questions and types of questions.
2. **Self-assessment processes**: Configure and manage self-assessments, defining the model to be worked on. This option defines the factors, characteristics, indicators and questions of a self-assessment model. In turn, the surveys that will be enabled for the different sources are configured.
3. **Institutional or Program Self-assessment**: Enable a self-assessment process for a specific program or institution.
4. **Registration of information (documentary / numerical)**: Record the weighting, documentary and numerical information, weaknesses and strengths to an institutional or program self-assessment
5. **Population and sample**: Identify the population to be evaluated, register parameters for sample calculation, register sample to an institutional/program self-assessment.
6. **Monitoring of evaluators**: List of evaluators of the self-assessment enabled, identifying who has carried out the survey, with the option of sending emails.
7. **Employer registration**: Register companies or employers.
8. **Definition of leaders**: Define self-assessment leaders and factor leaders.
9. **Download information**: Download list of evaluators, questionnaires according to type of source. In addition to all the information recorded in weaknesses, strengths and documentary and numerical information.
10. **Consult reports**: Consult the final report and the percentage self-assessment report of a process of an institutional or program self-assessment (see figure 2).

The user profiles that have been defined for access to the software are:

- **Administrator**: users with this profile are responsible for administering the entire system, having full access to all the options that are managed.
- **Self-assessment leader**: Profile that is enabled for those in charge of the program that is being self-assessed. The options to which you have access will allow you to monitor the self-assessment process applied to a program (see figure 2).
- **Leader factor**: Profile assigned to those responsible for leading a specific factor in a self-assessment process.
In detail, the processes that are enabled for each user profile are listed in Table 1.

**Table 1. List of processes enabled for each user profile**

| Processes                                                                 | Administrator | Self-assessment leader | Leader factor |
|---------------------------------------------------------------------------|---------------|-------------------------|---------------|
| 1. General data management                                                | X             | -                       | -             |
| 2. Self-assessment processes                                              | X             | -                       | -             |
| 3. Institutional or Program Self-Assessment                               | X             | -                       | -             |
| 4. Registration of information (documentary/numerical)                    | X             | X                       | X             |
| 5. Population and sample                                                  | X             | X                       |               |
| 6. Monitoring of evaluators                                               | X             | X                       | X             |
| 7. Employers Registry                                                     | X             | X                       | -             |
| 8. Definition of leaders                                                  | X             | X                       | X             |
| 9. Download information                                                   | X             | X                       | X             |
| 10. Consult reports                                                       | X             | X                       | X             |

**Figure 2.** Views of SAIP-Administration. A) Login to SIA, B) Final self-assessment report and C) Self-assessment leader options.
On the other hand, SAIP-Survey is the software used to apply the surveys configured in each institutional or program self-assessment process. The evaluation of a program or the institution by the different sources is carried out through surveys, which are configured and enabled from SAIP-Administration. The sources are the actors or members of the university community those of the external sector, responsible and protagonists of the facts that are the object of evaluation and who will be able to identify and express strengths and weaknesses [12]. Therefore, the user profiles that will be handled in the software are the types of sources that participate in the process, such as professors, administrative staff, students, graduates and employers.

To carry out the survey, the evaluators enter the software with their identification and password, as shown in figure 3. The system identifies the types of sources it has handles and depending on which one you choose it will show you the surveys to be carried out (see figure 3).

![Figure 3. Views of SAIP-Survey. A) Login in SAIP-Survey and B) Profiles enabled to conduct the survey.](image-url)
4. Results
The Unitecnar self-assessment model, using SAIP software as a tool, has generated greater effectiveness in the self-assessment processes of the Systems Technology program, the result of which is the accreditation of the program for 6 years, where it stands out by the Ministry of Education that the program has achieved sufficient levels of quality so that in accordance with the rules governing the matter this fact is publicly recognized through a formal act of accreditation [13].

To achieve the aforementioned results, the self-assessment process was carried out, which consisted, first, in the formation of the committees by factor, consisting of: a teacher, a student, an employee, an entrepreneur, a graduate. The process leader acts as the leader of the factor within the committee. These committees are responsible for constructing the report of the assigned factor.

The Institutional Quality Vice-Rectory responsible for the institution's self- assessments processes assigns a team member as the leader of the self- assessment process, who will be in charge of programming the software for the program's self- assessment process defining the factors, characteristics, indicators, questions and questionnaires that will be applied for each type of source. In addition, it is established according to the population the selection of the sample of each of the actors participating in the process such as teachers, students, employees, entrepreneurs and graduates linked to the program. For the case study of the total population of the program, a sample was defined according to the statistical parameters of a confidence level of 90% and a margin of error of 10%. These parameters are configured in the software (see figure 4).

Next, the survey is applied through the software, which can be tracked through a module in the application (see figure 5). This module also allows you to send reminder emails to the people involved who have not carried out the survey, guaranteed in this way that all the actors actively participate in the process.

![Figure 4. Sample values](image-url)
Subsequently, the documentary and numerical information of each of the factors is entered. This information is recorded by the leaders of factors that have been previously assigned and defined in the software by the leader of the self-assessment process.

Finally, from the surveys carried out, the documentary and numerical information recorded and the weighting of each factor, the results of the process are generated, which are sent to the committees by factor for the realization of the report, highlighting the strengths and aspects to improve the program.

The process described above has been carried out three times for the Systems Technology program, achieving the accreditation for four years in the first self-assessment and presentation to the CNA; in the second renewal process, accreditation for four years was achieved in the same way, and for the third process of self-assessment and presentation before the CNA, the accreditation of the program for six years is achieved.

5. Conclusions
The methodology developed in the self-assessment process for accreditation purposes; applied to the Systems Technology program has allowed three consecutive accreditations to be obtained, which demonstrates that the efficiency and reliability of the Unitecnar self-assessment process.

The use of computer tools in organizations allows to improve their processes, as is the case of SAIP in Unitecnar, which has generated greater productivity in the self-assessment processes for the purpose of accreditation and renewal of accreditation of the Systems Technology program.

Conflict of Interest.
The authors report there are no conflicts of interest.

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