

IMPROVING ACCREDITATION PROCESSES: METHODOLOGY CHANGES FOR THE ACCREDITATION OF ENGINEERING PROGRAMS

A comprehensive approach for process evaluation

Victoria Guerrini, Carlos Pérez Rasetti, Cynthia Jeppesen– CONEAU¹ – Argentina

After a first experience dealing with the accreditation of 24 medical programs during 2000 and 2001, the fact that evaluation criteria for thirteen types of engineering programs were produced posed a new challenge to the agency². It seemed then a proper time to revise procedures in order to adjust them to this new situation in which 246 different programs located in seventy institutions had to address accreditation.

It was clear from the beginning that changes in methodology and procedures should take into consideration those lessons gained from the agency's experience but should also adapt to the new field taking into account its institutional diversity and complexity. Moreover, it was plain that new developments concerning methodology could help in conceptualising a more in-depth assessment of educational processes. Time and experience have led us to believe that both methodology and empirical or practical considerations may have a more widespread or universal use and be adapted to other types of programs.

This paper acknowledges these issues. The first section discusses how the new object (engineering programs) was approached and its implications in terms of comprehensiveness. Also, issues concerning the tension between institutional and program evaluation and its feedback are presented. The second section describes how criteria were organised in order to establish a clearer framework and hierarchy. The third section addresses the assessment of the educational process whereas a new complementary instrument for outcome assessment was introduced as a way of stressing the analysis of outputs, which had not been satisfactory in previous experience.

1. A new object

The new object was distinctive, at least, because of the following reasons. On the first place, it consists of a numerous set of programs. Second, the object is also of a broader scope because, in most cases, different program profiles are developed within the same institution. This diversity had to be coped with considering that the core of accreditation procedures was engineering education in general, with different types of graduates. In

¹ Comisión Nacional de Evaluación y Acreditación Universitaria. National Commission for Evaluation and Accreditation.

² CONEAU is not in charge of devising accreditation criteria, which is done by the University Council.

opposition to other school traditions, different engineering programs coexist within institutions in a relative coherent and balanced manner³.

These distinctive features lead to an articulation of the self – assessment process so that it takes place simultaneously in each program within the same school. Given financial and time restraints⁴, together with a non - overwhelming – with – assessment’s policy, it was clear from the onset that this approach had operational and practical consequences as different programs within a certain academic unit were to be addressed at the same time.

The institutional dimension is especially relevant when addressing the ways in which resources are allocated to different programs. Academic management can be thoroughly understood when it is considered as the management of all the programs offered by the school. There are also operational reasons: it would be redundant to come once and again over the institutional aspects of every program. Finally, the whole picture could be missed.

However, it is important to stress out that although practical issues drove the agency’s policy, important questions were raised on the advantages of this approach. Up to what extent is this new approach relevant to genuine quality improvement? Although accreditation always includes an accountability component, procedures should help institutions to cope with assessments in order to introduce real improvement, in opposition to what in literature has been called “cosmetic enhancement”⁵. What are the boundaries and possible feedbacks between the pure- program - accreditation approach and a more comprehensive institutional analysis? For instance, when assessing programs’ curriculum, the institutional perspective allows to perform an in-depth analysis on how common trajectories are managed and its impact on staff, students and resources.

This approach, which stresses the importance of quality evaluation for improvement rather than evaluation for quality control⁶, led to the conclusion that the product of the overall process must be more than a checking list of weaknesses and strengths. It should be

³When referring to a rather balanced coexistence we are comparing to other types of schools where the most relevant program, for instance, is that of medicine in spite that others may exist and probably be of very good quality. In engineering schools, all types have very similar social meaning.

⁴ Due to the agency’s commitments and since accreditation is widely spread and demanded by universities, it was decided to handle as many programs as possible given a certain period of time (for instance, all of engineering programs during one and a half years). This approach not only enables to up-scale processes but is also an useful tool as it provides the ministry of education, universities and the public with core and systematic information on programs’ quality as well as improvement developments taking place in each institution.

⁵ There is a concern that in many cases evaluation processes are experienced as ways of “masking” real problems, as Newton points out, citing De Vries (1997, p. 96) : “Consequently, surface issues are brought to the fore and the covert remain intact. The result is that cosmetic enhancement is often effected and the losers are the students and the education process itself”. Newton, J. “Views from Below: academics coping with quality”, *Quality in Higher Education*, Vol. 8, No.1, 2002.

⁶ This is a clear choice of the agency since the evaluation of graduate studies started in 1997. See Villanueva, E. “Improvement and public accountability in accreditation of graduate studies in Argentina”, CONEAU working paper, mimeo, 2001.

a complete, profound and comprehensive “diagnosis” related to the capacities of the institutions and the quality of the teaching/learning processes taking place so that they can be the basis for the development of medium and long term improvement strategies.

Institutional evaluation and program accreditation

Although in the international experience “the choice between program versus institutional approaches of quality assessment”⁷, are usually referred as alternative in this case institutional evaluation and program accreditation are considered complementary for it allows a more profound and rich analysis on the quality of the teaching/learning processes.

If evaluation processes tend to follow one of the paths it is because, at both levels, key processes take place and they interact. Anyway, both perspectives fail to give account of the whole picture: institutional accreditation has shortcomings when addressing the differences in quality of programs that belong to the same institution. Program – focused accreditation will clearly address curriculum issues but will be feeble in identifying management problems at the institutional level that may, in turn, have different impacts in each of the programs. If this was the case, the basis for future improvement strategies may be missing part of the picture.

The institutional perspective allows for complete diagnosis of programs’ quality since problems may be related to the unit or to the program itself. Moreover, the implementation of improvement strategies finds all actors involved in the process, each one from his place and perspective. Also, it is clearly stated what issues have to be addressed at the level of the institution, what has to be tackled within the program and what has to be considered in common grounds.

Then, the institutional dimension allows for transversal view of each of the programs that are understood as curricular and operative expressions of an academic unit, which -in a more or less explicit way-, has a history, a context, a project, policies and an academic culture that will be the basis of any dynamic of future change.

Thus, the accreditation process follows two consecutive steps, being the first one, the analysis of the “educational capacity of the unit” and the second, of the “academic quality” of each program. The “education capacity” is centred in two nuclei (focal points) of analysis. The first refers to a general study of all types of *programs offered*, all actors involved and resources allocated: teachers, students, infrastructure, equipment, budget, libraries, rules and norms. The second refers to *academic management and policies* and examines the ways in which the unit manages those resources for different purposes. Also, a quality evaluation of the aspects that are centrally managed, such as: admission policies and instruments, common academic activities (basic studies, for example), credit recognition and institutional policies in general. This analysis is carried out in the context of all university *functions*⁸ so that the ways in which they interact, relate one another and how they impact on teaching are made clear. A second phase of the evaluation process is

⁷ Westerheijden, D. F. “Where are the quantum jumps in quality assurance?” Higher Education 38: 238, 1999.

⁸ University functions comprehend teaching, scholarship, research, extension and transference.

focused on the specificities of each program and its curriculum and is described in the next section.

2. Criteria organisation and process evaluation

Criteria is usually organised around four or five stratified components⁹: *faculty, students, curriculum, infrastructure*, etc. The problem with the logic behind this organisation is that it results in a kind of analysis that may “dismantle” the learning process. It is –using a mechanic metaphor- like reading a catalogue for car pieces: it is very practical for verifying the existence of pieces but useless for showing the machine in movement.

Something similar happens with criteria when the logic of stratified components is used in evaluation procedures: it becomes difficult to integrate and organise them in a hierarchy. Components are “strata” and their integration at the end of the process may be not systematic or may depend heavily on the model of institution that the evaluator has in mind. Moreover, the use of successive strata not only fails in describing processes but also does not give a hierarchy for understanding those processes. The confrontation of elements with criteria results in a configuration of binary results (although different levels of satisfaction can be established, any scale ends up in “fulfilled/not fulfilled”) and the methodology is not offering a tool for showing the level of impact that any of the verified element has over the nuclear learning processes. The weight depends on peer judgement and, in consequence, those opinions are comparable only as long as peers have similar backgrounds, conceptions, experience and expertise. As a result, the relative impact of different aspects is left to the subjective judgement of the evaluator.¹⁰

Moreover, this approach fails to give light on the ways in which potentialities and conditions of the institutions are *used* by the actors. Even though the evaluation encompasses both the analysis of conditions and analysis of results –as it will be discussed later on-, it is central to focus on processes.

The central issue to tackle when assessing a program *is about to know if it is successful in student training and why or why it is not*. This is the central issue to be tackled. It is possible, then, to distinguish between the criteria that are related to focal issues concerning the quality of a program and those that can be projected into those focal issues so that the resulting articulation produces evaluative *meanings*. We will give an example related to the quality of the infrastructure. Let us refer, as an example, to the quality of infrastructure. A classroom may be luminous because of its broad windows, or because it has enough sources of artificial light or, due to both reasons. But: ¿are they used for day

⁹ As examples, Criteria of the American Board for Engineering Technology –ABET -, the Self Evaluation Guides for medical schools in CONEAU, criteria for accreditation of medical programs of the Central American System of Higher Education Evaluation and Accreditation (SICEVAES), Guide for program accreditation and Manual for Peers of CNAP-Chile, the Manual for evaluation of agricultural engineering programs of Brazil and many others.

¹⁰ The procedures used for medical school accreditation introduced stages for group review and “consistency” work which were very useful to tackle this problem, but not sufficient.

time classes? ¿for evening classes? ¿in which proportion? Another example refers to faculty: academic qualifications get a real meaning for the quality of the program only when they are considered together with other components (for example, curriculum). Good faculty qualifications is a positive quality indicator in itself, but gives light on the quality of the program when considered in relation to teaching activities. The meaning is completed when both aspects are projected upon the outcomes of the students involved in those activities.

It is clear then that there are two levels of analysis: the institutional corresponding to the academic unit responsible for the program and the curricular level directly linked to the program itself. With respect to the latter (that centres on the quality of the program itself once the impact of the institutional dimension has been analysed) the evaluation focuses on the analysis of the academic quality of the program also in two nuclei: the “*curriculum development*” and the “*curriculum management*”.

First, all resources applied to the development of the program are displayed upon the curriculum and examined in its main features, practices and outcomes: faculty, students, infrastructure and equipment, budget, libraries. All these aspects are analysed in terms of the curriculum: the quality of the faculty qualifications in relation to each activity the teachers carry out in the plan, in relation to the kind of equipment they have and the ways laboratories are used for teaching activities. The library and its relationship with books, publications and reviews teachers require, the student outcomes in relation to faculty qualifications, the number of students in each activity in relation to the main features of the teacher team in charge of it –number of teachers, qualifications, research activities carried out, among others.

This approach provides guidelines for an exhaustive and complete analysis of the kind described above and allows the building-up of an image that becomes a “tridimensional model” on the curriculum map. Then, we pass on the second phase: the curriculum management, where all the issues arised in the previous analysis are seen from the perspective of their management, that is, those responsible for the supervision of the teaching/learning process, follow up of academic activities and internal evaluation methodologies

3) Assessment of the learning process: an emphasis on outcomes analysis

Outcome analysis may be one of the most relevant challenges posed to accreditation agencies because the production of valid knowledge, more or less exhaustive and complete, on what is actually happening with students along their academic trajectories is relevant not only for accreditation purposes but also because it provides more specific information when devising quality - improvement strategies. In this direction, some agencies have classified indicators as those that may give direct evidence of student learning, those that do it in an indirect way and those that give no evidence at all¹¹.

¹¹ For instance, the New England Association of Schools and Colleges´ classification mentioned in the Self Study Guide.

In general, criteria stress processes and conditions (namely, inputs) and accreditation procedures are based in methods that give scarce or almost no evidence (whether direct or indirect) about learning outcomes. In a way, input analysis is more advantageous than outcome analysis because once the lack of certain conditions (usually prescribed by criteria) is identified, adequate strategies may be developed in order to overcome it. Usually, recommendations issued by accreditation agencies tend to guarantee a quality learning process but institutions may achieve different results given the same or equivalent conditions or programs may have better outcome results even if they lack what is accepted as best conditions. Also, a feeble management of good quality resources or capabilities may result in unexpected outcomes.

Then the question is whether it is possible to encompass input and process analysis with the analysis of the outcomes of a given process. Nevertheless, it is important to point out that a focus on outcome assessment does not allow a thorough analysis that may help peers when making their reports and recommendations. In the international experience, outcome assessment has been approached in different ways. For example, the simplest perspective has focused on termination rates (those students that have completed their program within the estimated time).¹²

A more ambitious perspective focuses on competencies that students must have developed when completing programs. Anyway, when this perspective is materialised through a test¹³, derived conclusions may be partial because they do not consider, on the one side, other possible outcomes. On the other, and more fundamentally, leaving aside the conditions of the learning process does definitely not lead to a diagnosis and only determines what the symptoms are¹⁴.

In order to emphasise the analysis of the outcomes of the learning process it was necessary to consider a more comprehensive meaning of “outcome” that allowed the use of a result of a test (in terms of central competencies and knowledge actually managed by students for their future professional life) as well as students performance during their school life, including dropouts. And, in a broader sense, products in terms of staff and other academic outcomes achieved by teachers and academics, even researchers through publications or technological results.¹⁵

As a result, instruments - both aimed at self - assessment and peer review processes- were enriched with the aforementioned aspects related to academic work within an institution, students performance through the analysis of the exams and tests applied by students within their program and, as an innovation, a widely applied test to students was

¹² It is not an easy task especially because many students follow their courses on a part – time basis, may change their choice, stop for a certain period of time or simply because this indicator does not consider different levels of performance in students or any other specific indicator. El-Khawas, Elaine. “Accreditation’s Role in quality assurance in the United States”, Higher Education Management, November 1998, pp 51-52.

¹³ CONEAU Working Paper: Viale, Carmen. “Prueba de estudiantes previa a la titulación”, November 2001.

¹⁴ CONEAU Working Paper: Pérez Rasetti, Carlos, “Propuesta metodológica para la acreditación de carreras de ingeniería”, March 2002.

¹⁵ CONEAU Working Paper: Caillon, Adriana. “Comentarios al documento Propuestas Metodológicas”, March 2002.

introduced. The test ACCEDE¹⁶ aims at establishing which are the academic outcomes of those students that have accomplished approximately 80% of the program's curriculum.

The ACCEDE

The ACCEDE was certainly an innovation to the accreditation process and, as such, a great challenge. The international experience rapidly showed that although there have been several projects in the area of outcome assessment, experiences are of different nature and purpose and none really fitted the agency's purpose¹⁷, whose aim was to consider its results together with input and process indicators. The policy was to introduce outcome assessment (which is, as stated before, considered in a broad sense) as complementary to the analysis of the quality of a learning process. As long as the agency leads with both accountability and quality enhancement purposes, it is critical that accreditation reports offer thorough, complete, even complex, analysis on the learning process¹⁸.

Although it aims at measuring competencies and knowledge gained by students, the ACCEDE should be not confused with a licensing exam¹⁹. Moreover, the result of the test as an isolated indicator would lead to absolute results of the process (you can not accredit a program that fails the exam) and it would inevitably lead to rankings. This would certainly endanger the atmosphere in which assessment and accreditation procedures have been constructed whereas rankings are considered an unacceptable simplification as institutions must be considered in their diversity and complexity²⁰.

The ACCEDE was devised so that i) its results are incorporated to the accreditation procedure when performing self - assessment; ii) it is administered when schools are undergoing self – assessment and iii) it assesses students and not graduates that are taking a professional license²¹.

The test was specially devised *vis a vis* the criteria for the evaluation of engineering programs (that establish those basic contents and competencies that students must acquire) in order to know up to what extent and in which ways students have achieved that basic

¹⁶ Named ACCEDE, refers to competencies and knowledge actually managed by students.

¹⁷ Some Latinamerican countries have introduced this type of tests (Brazil with the Exame Nacional de Cursos o "Prova"; Mexico with the EGEL –Examen General para el Egreso de la Licenciatura- and Colombia, Examen de Estado de Calidad de la Educación Superior de los Estudiantes de Pregrado de Medicina). Their experience was a valuable background for the outlining of the ACCEDE.

¹⁸ For example in Brazil, the main indicator used when assessing the quality of a given program is the result of the test, which is applied every year. In Colombia, the test for medical students has a similar purpose.

¹⁹ Such as the licensing exams of national or state councils as the National Council of Examiners for Engineering and Surveying or American Medical Association (USA).

²⁰ "...there seems to be a consensus among national systems that there should not be any *Michelin Guide* approach to reports, i.e. that higher education institutions should not be ranked along single dimensions and listed by numbers". Christian Thime. "The European Systems of Quality Assurance – Dimensions of harmonisation and differentiation". Higher Education Management. November 1998, Vol. 10, No. 3, pp. 17.

²¹ The ACCEDE was first used by CONEAU in August 2002. All institutions involved in self – assessment for engineering accreditation participated. These comprises 46 academic units which 132 engineering programs. Out of a total of 3213 students with approximately 80% of the curricula completed, 1550 (ie 48,2 %) applied for the test. Percentages rise to 51,2 % when considering those students that started university after 1990 and to 61,4 % when considering those that started after 1996.

knowledge. Moreover, the institutions do not get “one” result but many “data” referred to basic contents and competencies²² and review criteria statistically processed.²³

Those involved in self – assessment work can analyse results, relate them to other results of the evaluation and pose hypothesis about the possible causes for certain outcomes. Achievements and failures should serve as the basis for a thorough analysis of the curriculum development. They have to be related to the study of the curriculum, to the analysis of each academic activity, faculty qualifications, other exams and tests taken by the teachers, projects developed by students, records, etc. In this way, ACCEDE’s results are far from being conclusive with respect to the whole accreditation process because its meaning and validity depend on the interpretation made during the self study since its statistical meaning is relative to the universe considered (the group of students of each program who participated in the test) and also because each piece of information²⁴ can be explained in many different ways.

²² Competencies linked to specific knowledge for different types of programmes, emphasising basic technologies. Criteria refer to: knowledge and problem solving, use of units and magnitudes, use of information, numerical or analytical calculus, skill for writing our a report.

²³ Statistical use of information is grounded on the group of students for each program through: admission year, number of students that applied the test vs total students, records obtained by those students. The report submitted includes :

- Number of students that have attended the test linked with their performance in the programme and the year they started school.
- Knowledge and competencies assessed, for each problem.
- Review criteria with appointed outcomes, media and deviation.

²⁴ For example, a. students did not properly gain the knowledge areas, b. there is no emphasis on those subjects because the graduate profile is different. Thus, a wide array of possible analysis can come up in order to identify programs’ weaknesses and strenghts. In the first case, the program should justify the reasons why their students have not gained knowledge and competencies, if there is a lack of lab work or if this group of students has had academic difficulties. In the second case, the program should discuss if the profile chosen is completely justified or if the curriculum should be revised and adjusted.