

UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO

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The National University of Mexico (Universidad Nacional Autónoma de México, or UNAM) is the country's most important university. Its student body accounts for one-tenth of all undergraduate students nation-wide, it grants half of all doctorates awarded, and most scientific, social and humanities research in Mexico is carried out within its centers. As a consequence, UNAM is of enormous relevance for the Mexican Higher Education System, MHES.

The present paper describes some of the main quality assessment activities UNAM has undertaken in recent years, and refers to two case studies for that purpose: the first relating to the engineering curriculum, and the second to graduate programs in general. Section 1 provides a brief description of the MHES; section 2 describes its main assessment programs and procedures; section 3 provides a general description of UNAM; section 4 describes its internal quality control processes; section 5 includes examples of the changes that can be attributed to the evaluation processes, section 6 presents the above mentioned case studies; and finally, section 7 describes the main conclusions that can be stated regarding UNAM's recent quality efforts.

1. THE MEXICAN HIGHER EDUCATION SYSTEM

The Mexican Higher Education System comprises a heterogeneous set of institutions, which provide education to a population of 1 359 057 students, with the participation of more than 100 000 academics.

The Mexican Federal Government co-ordinates and regulates the MHES through the Ministry of Public Education, which is responsible for its policies, priorities and strategies.

1.1. The system's structure, financing and government

From a legal standpoint, the System rests on a set of norms that regulate the structure, responsibilities and obligations of its components. Specifically, the Law for the Co-ordination of Higher Education (Ley General de Educación Superior) sets the basis for public fund allocation and regulates professional practice degrees, certificates issued by educational institutions, and the activities of professional associations. Under this general frame work, each higher education institution has its own regulations and, through them, defines its educational philosophy, its student admission criteria, its academic staff recruitment and promotion policies and its administration and financing rules and procedures.

In practice, external regulations are minimal, the number of students accepted by the different institutions is not regulated, nor is the opening or cancellation of curricula and study programs. Institutions define their policies in accordance with their own specific regulations, and the role of the Ministry of Public Education is of an advisory nature -although it exerts some influence through the funding it provides.

From a structural and operational standpoint, the MHES covers institutions of four types: universities, technological institutes, teachers' colleges and, recently, technological universities. Although the patterns that define each of them differ only minimally, the institutions within each category can be said to form distinct groups according to their academic structure, development, mission, nature of the education they offer, size and profile of their faculty, public or private control, budget and links with external sectors.

There is at least one institution of higher education in each of Mexico's 32 states, but their geographical distribution is significantly concentrated in the nation's capital and other large cities.

Within the Mexican Higher Education System there are institutions financed with public funds and institutions financed with private funds. While students in the former contribute little to the cost of their education, those in the latter group cover almost the entire cost. It should be noted, however, that public institutions do generate some income on their own, part of which comes from the contributions of their students. This income accounts for 10 per cent to 15 per cent of their total budget. On the other hand, since 1989 some private institutions have been receiving public funds through research grants and tuition for graduate studies.

The type of governance and administrative organization in higher education institutions is also heterogeneous. Most public institutions, and particularly universities, operate with governing models based on a central authority the rector and a set of collegiate bodies while the administrative systems are centralized and have large bureaucratic bodies. Owing to the nature and size of the private institutions, most of them have centralized government and administration structures, some times quite separate from the academic entities.

1.2. Educational opportunities, research and faculty

In 1994, the MHES had a total population of 1 359 057 students, 87 per cent of whom were undergraduates, 9 per cent were in teacher training programs and 4 per cent in graduate studies. Eight students out of ten from the first group, attend public institutions. The undergraduate students represents 15 per cent of the corresponding age-group (19-25 years of age).

Education at the university level is generally offered through study programs which prepare students for a specific professional career; that is, the curriculum is based on a group of courses within specialized subject areas with little or no flexibility to deviate from it. Currently, the MHES has hundreds of study areas at the professional or undergraduate level covering all fields. However, 58 per cent of the students at the undergraduate level are enrolled in ten major areas: public accounting, law, business administration, medicine, industrial engineering, architecture, civil engineering, computer sciences, electronic engineering and psychology.

The participation of women has increased noticeably: they now account for 45 per cent of the total student population. Their participation is particularly high in the areas of education and humanities where they represent 65 per cent of the student body, in the health sciences where they account for

59 per cent of the overall enrollment, and in the social sciences and business administration where 54 per cent of the students are women. The areas in which men are still predominant are engineering, technology and agricultural sciences.

In addition to the wide diversity of fields of study available within the MHES, their distribution is heterogeneous and there is no specialization by region. As mentioned above, there is no national regulation as to the number of fields of study or number of places offered in each region. Therefore, some fields of study are found to be offered simultaneously by several institutions in a region of the country while other regions lack these fields completely. There are also imbalances in the regional distribution of educational opportunities available: 55 per cent of the students enrolled in programs leading to a bachelor's degree are concentrated in six states, and 23 per cent of them are located in Mexico City. The MHES is imprecise in other aspects: engineering studies, for example, are just as likely to be offered at a university, a technological institute or a technological university, and slow down the opening of new fields of study and graduate programs, which are required by the job market.

The graduate population accounts for only 4 per cent (54 910) of all students enrolled in higher education programs. Graduate students are concentrated in specialization and master's degree programs. Fewer than 4 000 students are registered in doctoral programs. Thirty eight percent of graduate student enrollment is concentrated in the administrative and social sciences, and 2.5 per cent in the health sciences. Geographically, 24 per cent is located in only four states.

Although research in the MHES accounts for more than half of the research efforts of the country as a whole, it is an important component only in some public institutions, where it is conducted in association with graduate programs.

The academic staff in the MHES consists of 135 128 faculty members, 85 per cent of whom are in universities and technological institutes at the undergraduate level, 8 per cent in teachers' colleges and 7 per cent in graduate programs. Diagnostic studies of the System also bring out several weak points: only 28 per cent of the academic staff devotes itself full time to university activities, and only 31 per cent have a graduate degree.

Some part-time faculty members are professionals with a successful private practice as solicitors, accountants, engineers, dentists, surgeons, etc.; others have a job elsewhere and resort to teaching as a way of increasing their earnings, sometimes teaching in different institutions. Very few lecturers however have received training as teachers and their salaries are low, despite special training programs and payment plans.

2. EVALUATION IN THE MEXICAN HIGHER EDUCATION SYSTEM

Quality began to appear in the public discourse regarding higher education in the late 1970s, perhaps as a reaction to the quantitative growth taking place in the education system. At first, quality was introduced through planning policies and mechanisms; subsequently, a national movement was initiated both to make quality guide the changes then occurring in higher education and as a safeguard of the educational institutions. In 1978, policies and measures in that direction were specified, when the National System for Planning in Higher Education (Sistema Nacional de Planeación Permanente de la Educación Superior) was established. The 1981-1991 National Plan for Higher Education was announced with state, regional and national co-ordinating units for planning. This is considered the

first instrument in Mexico that addressed the development of higher education on a long term perspective. The Plan gave rise to various deliberations and recommendations for institutions, but they were only of an advisory nature, and evaluation, while included in the discourse and logic of the planning process, was not a formal mechanism with consequences for the System and its institutions.

The planning policies, mechanisms and programs thus introduced had almost no effect on the face of strong financial difficulties and the steady growth experienced by the Mexican Higher Education System. By the mid-1980s, opinions expressing concern over the quality of the MHES had become widespread, and public discourse took on once again the topic of quality in education, but this time from a viewpoint that encouraged policies, mechanisms and programs to ensure it.

In 1984 and 1985, the federal government attempted to guarantee quality through a Comprehensive Program for the Development of Higher Education (Programa Integral para el Desarrollo de la Educación Superior), which indicated eight lines of action: growth, human resources, economic resources, planning and co-ordination, teaching, research, cultural activities and extension services, and administrative support.

From 1989 to 1992 public policies were aimed at modernizing the Mexican Higher Education System. To that end, they placed emphasis on linking higher education to social development; on improving quality while meeting the demand for higher education to the extent required to ensure that members of disadvantaged social groups with aptitudes for study had the opportunity to do so; and on strengthening the national co-ordinating and planning system for higher education so as to provide guidance for internal evaluation and restructuring processes. Of these policies, the most noticeable was that regarding evaluation processes, particularly those related to public institutions in the MHES.

Along the same trend, in the late 1980s public policies were strengthened to promote quality in higher education and to establish national evaluation standards: the 1989-1994 Program to Modernize Education considered evaluation to be a priority policy and interpreted it as a participatory process with feedback for the higher education system. The process included assessment, feedback and final validation actions, and at the same time, established parallel lines of evaluation at three levels: 1) institutional, carried out by the institutions themselves; 2) interinstitutional, performed by members of the academic community; and 3) higher education system, implemented by peer review.

At present there are several operational schemes and public policies oriented toward the promotion of quality assurance in higher education. Although each has different goals, mechanisms, and characteristics, they can be grouped into two large categories: those oriented toward the assessment of individuals and those related to institutional assessment.

2.1. Individual assessment

Since its establishment in the early 1970s, the National Council on Science and Technology (Consejo Nacional de Ciencia y Tecnología), CONACyT, has been funding research projects on a competitive basis. Three programs of this type are now in operation at the Council, and in all of them evaluation is the responsibility of committees formed by scientists. Selection based on evaluation means funding and prestige for the recipients.

The National Researchers System (Sistema Nacional de Investigadores), established in 1984 to promote scientific and technological development gives monthly stipends to researchers as a reward or incentive for the efficiency and quality of their work, and is the first nation wide “merit pay”

scheme. Researchers who wish to be part of this scheme submit their curricula, publications and scientific papers. The applications are evaluated by peer groups on the basis of the quality, quantity, impact, originality and technical complexity of the research and technological development activities during a fixed period of time. On the basis of the evaluators' appraisal, the researchers receive a monthly stipend (in addition to their salaries) in accordance with the assessment they received. This Researchers System has been operating regularly for 12 years, covers now nearly 6 000 researchers, and the prestige it conveys to its members is now as important as the economic benefits it entails.

Similarly, a National Program for Teaching Careers (Programa Nacional de Carrera Docente), was established in 1990 to promote quality among full-time academic staff of public higher education institutions, awarding monthly bonuses in addition to their salaries. The evaluation mechanisms vary among institutions, and the evaluation committees, which generally include prestigious staff members, evaluate the applicants on criteria of quality, productivity and academic relevance. Although this program operates in all public institutions in Mexico, the actual evaluations vary in methodology and standards of academic achievement. Limited financial resources made impossible a general increase of academic salaries; insatisfaction with academic standards, specially amongst part-time lecturers, made it inadvisable. Thus, the Researchers Program and the Teaching Careers Program were both targeted so as to benefit selected groups. Considering that full-time academics on average have higher qualifications, stronger academic histories, and greater dependence on their academic wages than part-time personnel, only they were eligible to the Teaching Careers Program.

2.2. Institutional evaluation

In 1989, the Ministry of Public Education established the National Commission for the Assessment of Higher Education (Comisión Nacional de Evaluación de la Educación Superior). Its tasks include the establishment and co-ordination of a process for assessing higher education at a national level, making this an ongoing and permanent process. The Commission must also develop quality criteria and standards for activities and tasks at this educational level, and for the existing evaluation entities, by providing appropriate procedures and instruments.

To date, the work of the Commission has been conducted along three lines of action: institutional assessment, a responsibility left to be carried out by the institutions themselves, through an annual self-evaluation; overall assessment of the MHES and its different groups of institutions; and an inter-institutional assessment of subject programs, based on the opinion and appraisal by members of the academic community regarding specific areas of knowledge. In all cases, the assessment is entrusted to evaluation committees formed by scientists. As a result of the evaluations, institutions receive grants and financial support.

In 1991, the Commission established inter-institutional peer committees for the evaluation of Higher Education Programs, formulated general guidelines for their operation, and suggested the strategy to be followed in these evaluations. The evaluations made by the committees focus on the curricula and study programs at the institutions. These assessments are entrusted to committees formed by external qualified academics with recognized professional credentials, are conducted in direct interaction with those involved in the program being evaluated, and provide practical guidance for improving the institutions under review. The evaluations have proved to be appropriate and effective models for the evaluation and self-evaluation of Mexican institutions of higher education. The committees write reports which focus on well-founded recommendations, and suggest measures to be taken by those responsible for each program in order to upgrade the quality and efficiency of their duties. However,

there is no follow-up to the committees recommendations. Some institutions act upon them, others do not react without suffering for it in anyway on the short term, although there is a cumulative negative effect that can be noticed after a few years both in its image as well as on the treatment it receives by the Government funding agencies.

Since the early 1980s, CONACyT has been establishing a set of programs to promote quality in graduate studies and to upgrade their preparation for scientific and technological endeavors. The programs rely on evaluations conducted by scientists, and as a result of their assessment of the graduate programs, the Council grants financial resources to the institutions to be used for specific purposes. Perhaps of greater importance, since 1989 OCNAYT has limited its fellowships only to those programs whose evaluation has been positive. Since CONACyT grants the largest number of graduate fellowships in Mexico, any program deemed ineligible by CONACyT will usually see its number of applicants drop significantly.

The Fund for the Modernization of Higher Education (Fondo para la Modernización de la Educación Superior) is a funding mechanism established in 1990 by the Federal Government, in order to help modernize the infrastructure and improve the quality of services rendered by public universities. The Fund provides financial resources for implementing activities identified by the institutions of higher education through evaluation and planning processes. A central part of its operation are its follow-up and performance evaluation procedures. Based on random observation visits by expert examiners, the procedure has significantly helped to improve the facilities and physical conditions of higher education institutions, but also to modernize their views on governance, administration and academic development.

It may be said that the peer review and quality assessment policies and mechanisms used between 1989 and 1995, have made significant contributions to a widespread acceptance and use of evaluation instruments, and to a growing concern regarding institutional development and academic standards improvement. Furthermore, some findings have resulted in financial measures regarding public resources allocated to institutions of higher education.

For the years 1996-2000, the Mexican federal government has clearly stated it will strengthen its planning, implementation and evaluation activities on higher education, through closer communication, concerted agreement, consensus decisions and shared responsibility with all institutions and social entities involved, both public and private. The government plans are to continue promoting the self-evaluation and external evaluation of institutions in addition to the evaluation of academic programs, of student progress and of teaching quality. The development and use of criteria and quality parameters applicable to a wide range of institutions is also being promoted, together with evaluation guidelines for their efficient application.

3. THE NATIONAL UNIVERSITY OF MEXICO

The National University of Mexico is Mexico's largest and oldest institution of higher education, as well as the main institution of the MHES. Its origins date back to the mid-sixteenth century when the Real Universidad de México was founded, although it was not until the beginning of this century that it became a national university and until 1945 when its present charter was enacted.

UNAM is a research university, therefore carrying out both the training of human resources and the generation of knowledge in sciences, technology and humanities. Its former mission is carried out

through 22 schools located within the metropolitan area of Mexico City, attended by 140 000 undergraduate students and 15 000 graduate students. Research is conducted at these schools, but in addition, UNAM has close to 70 entities (46 institutes, 11 centers and 10 university programs) specifically dedicated to research in all areas of knowledge. Although most research facilities are located on the main campus in Mexico City, UNAM has also important research centers located in other regions of the country. Besides its two major activities of teaching and research, UNAM also plays a cultural role carried out through 12 departments with more than 6 000 cultural activities a year in the areas of theater, music, radio, television, cinema, literature and dance.¹

Owing to its teaching, its scholars, its cultural and research activities, its history, the role it has played in the nation's development, and the dynamics of its student and academic bodies, the National University is an institution of great significance for Mexico, as well as its most important teaching and research institution.

UNAM's governance structure is complex, based both on several individual and collegiate authorities. The former include the rector and the directors of schools and institutes, while the latter include the University Council, the Board of Governors, the Board of Trustees, the various Academic Councils at schools and research centers, as well as the recently established Area Councils. The role played by these collegiate bodies in running the University is of the utmost importance, since they are responsible for decisions concerning the academic development and the future of the institution.

The University operates on the basis of a broad and diverse structure and an essentially centralized budget. Its administrative management requires dozens of offices scattered throughout the country, some of which are hundreds of kilometers from the central campus, attending the needs of more than 50 000 employees, including academic and support staff. Its annual budget --90 per cent of which comes from government funds-- is determined and distributed from the central offices, where the demands and plans from all the university groups and the requirements of major institutional programs are integrated. To date, the leeway academic and service entities have for using and distributing the funds allocated to them is limited; however, the institution is gradually preparing to move towards responsibility center budgeting in an effort to decentralize its financial and administrative operations.

Over the past three decades, the institution has experienced a dynamic development, not always for the best. During the 1970s, enrollment and academic staff increased exponentially, and teaching and research expanded and extended out of its main campus through various decentralization measures. During the 1980s, UNAM experienced a governance crisis as a result of several academic and administrative reforms which in the end were not implemented. As a result of that experience, in 1989 the University began to implement an institutional development program containing various policies and goals to unite teaching and research activities and upgrade its curricula; to strengthen its facilities and infrastructure for academic work through library modernization measures and computer and telecommunications development; to build new facilities and acquire modern research equipment; and to achieve a comprehensive decentralization of the University, with a view to reduce bureaucratic loads and create a university system organization.

1. UNAM is also responsible for the operation of a large pre-university educational system comprising 14 high schools with over 105 000 students. All figures mentioned in this paper --for students, staff and support personnel-- refer only to the undergraduate and graduate levels.

4. INTERNAL METHODS OF QUALITY ASSURANCE

At UNAM, the concept of quality has varied over time. In this century, three different concepts are present, all linked to the university mission, but varying with the changing objectives and priorities of Mexican society. The first one refers to quality as viewed by a society which considered higher education as a means for social mobility; another is that viewed by employers who needed a steady supply of well prepared professionals and technicians; and yet another is that taken by politicians and government officials who consider that universities should respond fast and uncritically to government policies and initiatives. All of these are external rather than intrinsic since knowledge and scholarship were more or less taken for granted with having a university, and it was assumed professors and lecturers would pursue and maintain high standards; there were no references against which to judge the universities academic quality and output. Initially, when universities and academics were few, this was essentially true and no need for references was felt; when the university system expanded, and that was no longer the case, very little effort was made to correct that trend: quantity not quality was the main concern. Later on measures to change the declining concern for academic responsibilities were hindered by low salaries, difficult job conditions and opposition.

During the 1920s and 1930s, quality was essentially determined by its alumni participation in the industrial development of the country; that is, quality amounted to the training of the growing number of professionals needed to lead, organize and support the urban and industrial progress the nation was experiencing. In the 1940s and 1950s, quality was closely associated with social mobility; there was a stable demand for professionals, and university graduates entered the workforce to earn reasonable salaries. From the late 1960s onwards, quality has been linked to the demands of the various economic, political and social sectors, which expected universities to fulfill a critical role, particularly in the 1970s when the times of steady economic development came to an end.

At the end of the 70's and the beginning of the 80's quality of staff began to be of great concern. Questions regarding the knowledge base of lecturers, scholarly competence of full time personnel, and quality of research conducted began to be raised, establishing the foundation for *ad hoc* programs later to be launched both by the government and by the institutions themselves some of which are described in this paper.

The 1990s can be characterized by the widespread disenchantment pervading all areas of Mexican society, including academics in higher education institutions, by the severe drop of salaries, the reduction of public investment, severe budgetary restrictions, and rising unemployment. In addition to all of the above (which meant declining resources) institutions of higher education were beginning to be confronted by questions regarding their relevance and benefit to society.

UNAM chose to redefine its concept of quality by making a thorough revision of its goals, a revision which took into account its traditional values, traits and role, but also considered its links to the outside world and what was happening there. On assuming this position, the University worked to strengthen evaluation as a useful concept and as a practice to be encouraged, and sought to promote quality through institutional programs and incentives rather than through changes in by-laws and regulations.

The acceptance and use of evaluation were thus slowly but steadily directed towards an objective assessment and rating of quality in all the processes carried out within the institution, enhancing the

participation of academics in the institution's management and promoting better teaching, research and cultural activities.

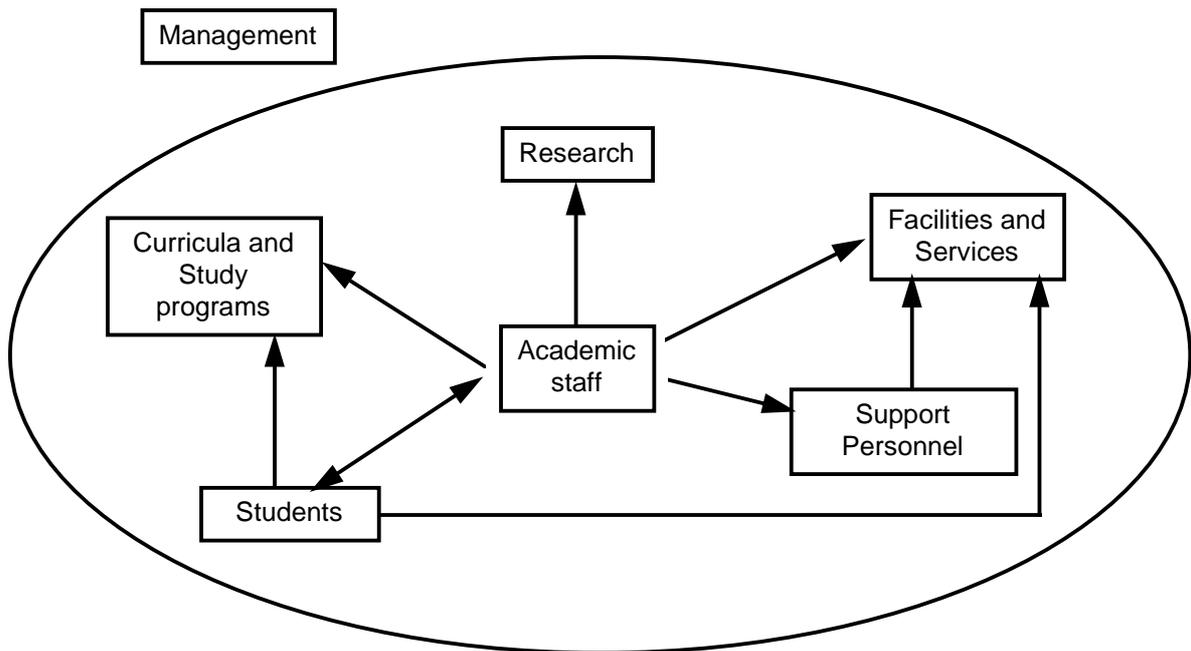
Since 1989, the National University has been working towards quality enhancement along two main lines of action: the first, by establishing an institutional policy to make the University "more academic", meaning by that a process that places academics at the center of the discussions and decision-making analysis, strengthens collegiate bodies, operates solid academic programs, links faculty members among themselves and with students, improves academic working conditions, and ensures the administration responds to academic interests. The second line of action, of a more practical nature, relates to the improvement of the institution's working conditions by having better facilities, services, salaries and regulations, and by promoting an efficient and effective management.

Although due to its size it is very difficult to make rapid changes at UNAM, many practical results have already been achieved that can be said to be a result of these policies and the evaluations carried out; for instance, academic salaries are now closely linked to performance.

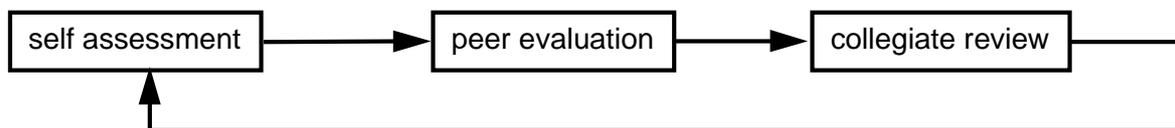
Currently, the UNAM evaluation system is complex, multidimensional and versatile. It combines tradition and innovation in a way in which one works with the other to promote, sustain and improve institutional quality in a comprehensive manner. In describing the evaluation system now applied at UNAM, we have to consider all aspects covered by the system: academic staff, students, curricula and study plans, research activities, facilities, support personnel, and management. University management embodies all the other aspects and provides institutional coherence.

The links between the different aspects or variables considered in evaluation are shown in the following figure.

Academic staff auto-evaluates itself, assesses the students, the curricula and programs of study, and the research activities, and has also a role in evaluating the facilities and the support personnel. Students participate, to a limited extent, in the evaluation of academic staff, curricula and study plans and facilities. Support personnel auto-evaluates itself and evaluates the facilities. All variables are subject to internal evaluation processes, and, in parallel, academic staff, research, curricula plans, and infrastructure facilities are also subject to external examination.



Internally, there are two evaluation processes within a well-established feedback system: one is on an individual basis beginning with self-assessment followed by peer evaluation and concluding with collegiate body evaluation.



The institutional self evaluation process in turn starts with an evaluation at a local level of projects and group development followed by a self evaluation of the complete organizational unit (school, institute, etc.), moving to a review assessment of a whole area or system within the university, and concluding with a review report at the institutional level.



These various evaluation review exercises vary in frequency and period covered, except at the unit level, which is invariably performed on a yearly basis; they also vary in depth, purpose and objectivity.

4.1. Academic staff

Academic staff evaluation is a permanent and regular feature at UNAM at least as far back as 1945. Academics are evaluated on joining the university, for promotion, for tenure, and, recently, to receive salary bonuses according to their performance. The evaluation mechanisms vary according to the type of position held (of the 24 000 academic staff members in the institution, only 27 per cent hold a full-time position) and the purpose of the evaluation.

Academics become University staff members through a competitive evaluation held by ad-hoc decision-making peer committees in each academic unit, some of whose members belong to a different unit.

This acceptance procedure is publicly announced and open to anyone who meets position requirements. Aspects evaluated include academic and professional qualifications, teaching experience, and research and extension activities history.

Promotion and tenure evaluations are performed in a similar fashion but are open only to academics in such situations. The evaluation committee verifies that the applicant fulfills the requirements, and evaluates his academic performance, including the way he has fulfilled his obligations, and the opinion of his work held by the head of the unit and by the local academic council.

b) In 1989, UNAM decided to boost the quality of its academic staff through different schemes, all based on collegiate body assessments that provide grants, rewards and salary incentives according to performance in teaching, research, extension and institutional support activities.

The Rewards Program for Full-Time Personnel (*Programa de Primas al Desempeño del Personal Académico de Tiempo Completo*) established in 1990, evaluates academic performance and grants salary bonuses at one of four possible levels (up to twice the person's base salary). Evaluation is conducted by five-member peer committees, with three of the examiners not belonging to the unit. The factors considered in the evaluation are: training and schooling, teaching performance, academic productivity (research as well as scholar and extension activities) and Cupertino in institutional programs and duties. These factors receive different weights according to the position held by each academic, his duties and his area of work within the university.

The Incentives Program for Lecturers and Part-time Personnel (*Programa de Estímulos a la Productividad y al Rendimiento del Personal de Asignatura*) began in 1993 provides incentives for academic members who have teaching duties only on a part time basis. The incentives vary according to their teaching loads and the evaluation is performed by the academic council of each organizational unit. The assessment relies basically on their compliance with course obligations.

University Awards (Premio Universidad Nacional). To foster excellence, once a year since 1985 recognition is given to those members who through their work have contributed significantly to the institution or made important teaching, scholar or research achievements. The evaluation is made by a peer committee in each of 17 areas of knowledge. The candidates are nominated through the collegiate bodies of the University, and the committee members are selected from amongst well-known academics.

University Distinctions for Young Academics (Distinción Universidad Nacional para Jóvenes Académicos). By awarding this distinction to young academic members, the University encourages since 1989 continuous efforts in academic careers. The distinction is also granted in 17 areas, the

examiners being the same as those for the University Award, and the candidates nominated by the same collegiate bodies. The evaluations focus on the academic development of the candidates and on their productivity in contributing to the substantive work of the institution.

Through a program started in 1980 and progressively being implemented in all teaching units, teachers are also being evaluated by their students. The program is intended to provide teachers with important information on their performance within the classroom as seen by their pupils. Students are asked to assess teachers competence on subject area, degree of commitment, and usefulness and value of the teaching-learning process. To validate student opinions, they are themselves evaluated on class participation, learning interest, responsibility, time devoted to study after school, and project/homework preparation.

4.2. Students

The Institution uses several student evaluation schemes, some specifically oriented to help in deciding student admission; others to assess their academic progress.

Admission. Since 1970 students are admitted to the University through one of two schemes. The first, applicable only to those students who graduated from UNAM's high school system, requires them to have a grade average of seven (in a one to ten scale) in their pre-university studies. These students entered UNAM's high schools through a competitive entrance examination. The second mechanism is through a competitive written exam both on general subject questions, as well as questions related to the specific field of study they wish to pursue. This last selection procedure is based on a comprehensive test developed by UNAM over more than twenty five years, and supported by a framework of cognitive psychology and psychometrics to guarantee the subjects under evaluation are indicative of students' present and expected performance. The nature of the entrance examination consists at present of one section made up of 60 items that evaluate the basic knowledge all candidates should have, plus another section (also of 60 items) to evaluate key abilities and knowledge in the student's special area of academic interest.

Diagnosis. In addition to the entrance examination, a few years ago (1993) the University began to apply a placement test, which assesses the knowledge level of UNAM's freshmen. Started initially by only a few schools, to place students on different streams and to apply remedial courses when needed, it has now been extended to all new entrants. It provides information useful for curricula planning, student streaming, student counseling, and syllabus planning.

Ordinary academic progress assessment. At the University the mechanism regularly used to assess the progress of students is the application of exams at the end of each individual course. These are generally designed, applied and marked directly by each individual professor, although in some cases departmental (*i.e.* non-specific) exams are used. Student's grades are registered in four general levels of performance: NA (*no acreditado*, fail), S (*suficiente*, pass), B (*bien*, good) and MB (*muy bien*, very good). Besides exams, some professors assess student achievement and general level of competence through class participation, essays, laboratory work, and other assignments.

Honours Program (Programa de alta Exigencia Académica). In 1991 UNAM started a streaming program based on a voluntary commitment of both students and academics. Without resorting to new curricula, the honours program uses methods and strategies geared towards developing students' analytical skills and to help them learn how to better search for and organize information, put together

study plans, and set and solve problems in a more efficient manner. Students' autonomy, productivity and creativity are stimulated through appropriate methodologies, academic tutorials, ancillary courses on computing and English, and short periods in professional and research environments. One of the University's goals is to extend this program throughout the whole Institution.

Graduation requirements. Before awarding a diploma and in addition to a successful completion of their coursework, the University requires of its students to prepare a research report (*tesis*) or a research essay (*tesina*). Either one of them has to be approved by and defended before a board of at least three examiners. In some cases, most notably Medicine, the professional diploma requires passing also a comprehensive examination on all subjects covered during coursework and training periods.

4.3. Curricula and study programs assessment

At UNAM, curricula and study programs are always designed, formulated, evaluated and changed by collegiate body actions.

They are first evaluated by the local academic council where account is taken of the opinion and recommendations of an external Inter-institutional Committee for the Evaluation of Higher Education (*Comité Interinstitucional para la Evaluación de la Educación Superior*); they are then turned over to one of five institutional Area Councils (*Consejo Académico de Área*), which seek the advice of specialists within or outside the Institution. When updating the curricula, the Area Councils have the final say, but when new projects are set up, these projects must also be approved by the University Council (*Consejo Universitario*).

4.4. Research evaluation

UNAM has a high reputation in nearly all fields of learning, mostly as a result of its research activities. Some indicators show the relevance for Mexico of UNAM's research: a high percentage of all scientific production generated in the country is attributable to UNAM; slightly over a third of all the researchers who are part of the National Researchers System belong to UNAM and enjoy national and international recognition. This situation is both a result of the Institution's efforts to enable research to be carried out under the best possible conditions and a reason to preserve and enhance its present quality. In 1991 several new programs involving evaluation in decision-making processes were put in place to support these endeavors.

Program for Research and Technological Innovation (*Programa de Apoyo a Proyectos de Investigación e Innovación Tecnológica*). This program, began in 1990, is aimed at furthering areas important for Mexico's development, through competitive research grants. Successful projects receive financing for up to three years. The program provides full-time academic staff with greater possibilities for professional development; promotes the development of collective projects, thus strengthening and articulating research efforts at UNAM; and favors the participation and collaboration of junior academic staff with academics of longer standing. Project evaluation is performed by five different peer committees appointed by UNAM's collegiate bodies.

Teaching Improvement Program (*Programa de Apoyo a Proyectos Institucionales para el Mejoramiento de la Enseñanza*). Recently established (1993), this program is aimed at developing and strengthening the education basis and teaching innovations of the University. It attempts to

attract senior faculty members and have them devote more attention and efforts to the development of innovative approaches to teaching and to the improvement of the teaching-learning process. Academics of every discipline and area of knowledge are invited to submit projects that will improve the quality of existing teaching modalities at UNAM, either by the development and application of innovative teaching methods and techniques or through the use of new approaches to the learning process.

In this program projects can be presented in one of five areas and are evaluated by peer committees assisted by external education experts. The evaluation committees issue their recommendations to a collegiate body which authorizes the allocation of resources.

4.5. Support personnel evaluation

Through an innovative program, UNAM began in 1995 a systematic evaluation of its support personnel. Numbering close to 20 000 employees, having a strong union, low salaries and almost no incentives, this personnel had opposed any form of organized assessment of their activities. The Program for Quality and Efficiency on the Job (*Programa de Complemento al Salario por Calidad y Eficiencia en el Trabajo*) started in 1994 and provides salary bonuses to those members of the support staff who through their job performance contribute to the overall quality and efficiency of the services provided.

The program relies on two evaluation bodies: a bipartisan local commission on each organizational unit and a bipartisan technical committee for the whole institution. Evaluation takes place every four months and the elements considered are: quality of work, initiative shown, know-how, care taken with materials and equipment, and attendance record. The employee's immediate supervisor is responsible for the initial assessment, followed by a collegiate evaluation which weighs the merits of each employee in the attainment of predetermined goals of quality and efficiency. A bonus for quality of work and efficiency on the job is given to each employee on one of six possible levels of achievement and representing a percentage of the monthly salary they earn (0, 4.5, 9, 13.5, 18 and 22.5 per cent).

Originally planned as a two tier evaluation, one assessing individual merits and one assessing group performance, only the first was implemented due to strong opposition to the whole scheme. This opposition forced other changes. The program was started as non-compulsory, open to all that wished to be part of it; and the evaluation periods were reduced so as to maintain its improvement potential even for those who had received a low mark or not participated in a given period.

Only a third of the employees participated in the first evaluation (6 000), but nearly three quarters were participating by the fourth. In addition, union leaders are now considering accepting the collective or group evaluation.

4.6. Facilities evaluation

Over the years, the National University of Mexico has built a strong tradition in construction planning, building maintenance, and materials and equipment procurement, as it owns more than 1 000 buildings all over the country, which have to be equipped, maintained and served; with a main

campus sitting on 700 000 m² of high value grounds well within Mexico City, and close to 400 buildings, some of which are well known for their architectural qualities.

UNAM also houses the largest book collection, the greatest computer capability and one of the most extended telecommunications network in the country. Not considering the National Library (run by UNAM) its more than 100 libraries hold over 6 million books; its schools, research centers and administrative units use close to 25 000 personal computers, 200 work-stations and a large parallel supercomputer.

Allocation of resources for maintenance, remodeling and construction of new facilities for each and every one of the schools, institutes and centers, and for the common grounds, buildings and service facilities, requires a continuous assessment of future needs as well as of present use and conditions. Decisions regarding library facilities, books, journals and electronic information require continuous assessment; the same applies to computers, as well as video and data transmission facilities.

a) Regarding buildings, each of the organizational units of the University establishes its space needs for class rooms, laboratories and other purposes in a document known as the Building Master Plan (*Plan Maestro Inmobiliario*). Covering a four-year period but yearly updated, it includes information on conservation, remodeling and major overhaul needs, as well as a forecast on future space needs. It also establishes priorities and an estimate of the financial resources necessary to cover these priorities. The university's central administration, with the assistance of technical experts, evaluates the requirements and proposals against educational, architectural, and financial criteria. The results of this evaluation are submitted to the rector for inclusion in the budget allocation process. The budget is annually submitted for approval to the University Council.

b) To plan and evaluate computer development at UNAM, an Advisory Committee for Computing (*Comité Asesor de Cómputo*) was established seven years ago. Formed by nineteen members, it has the following main functions: to formulate the general development plan regarding computer and telecommunications services; to provide a space for discussion on computing services and institutional policies for the procurement and maintenance of computing equipment; and to explore the needs for special resources or developments in these areas.

In a similar fashion, since 1990 the Committee for Library Services (*Consejo del Sistema Bibliotecario*) assists in the organization and development of the University's libraries. Made up of 23 members, some of which are students, professors, researchers, librarians, deans and university officials, the Committee establishes general policies, approves the short term development plan, formulates the annual budget proposal, allocates resources amongst the different libraries, sets the standards of use for emerging technologies, and evaluates library services.

4.7. Institutional evaluation

The University's program of activities is defined in the yearly Institutional Plan (*Plan Institucional*) comprised by the aggregation of a Central Plan (*Plan Central*) and the local plans of the different organizational entities. The Central Plan is the sum of the rector's program, the programs of all administrative and service units, and the institutional programs, meaning programs applicable to the whole University.

At the end of each year all academic staff members must submit a report on his or her activities for the closing year, and a work program for the coming year. This individual self-assessment exercise forms the basis for the self evaluation at the departmental or group level and, through their aggregation, at the organizational unit level.

In addition, the heads of all academic units formulate a yearly report from the moment each of them takes office. This report is presented to the specific community, frequently in the presence of the rector, and is later printed and distributed throughout the university. In a similar vein, each year the rector presents his annual report, highlighting the institutional programs and the general state of the University.

The University's annual budget is presented to the University Council, printed and distributed openly once approved. An accounting firm appointed by the same Council audits the University's financial state and operating conditions, and its reports are made public. The Board of Trustees regulates the everyday operation of the University's finances, oversees the compliance with its administrative procedures and regulations, and takes care of University properties and fiscal obligations.

In 1993 the University decided to review its administrative and management operation procedures. In order to do this, it established a seven member steering committee which defined the terms of reference for the exercise, appointed an external consultant firm for the task, selected the areas of management and administration to be covered, reviewed the progress made and received the final report and recommendations of the review.

Extending for a period of almost two years, all the main operation areas of the University were evaluated. The assessment procedure included an analysis of each area's purpose, organization, personnel procedures, and resources. After a comparison of stated goals and regulations with actual practice, an assessment of the services provided was requested from those responsible for their execution as well as from those who benefited from them. This institutional operational assessment was therefore supported on: *i*) a self-evaluation by those responsible for the institution's administration and management; *ii*) a step-by-step operational verification of how it is actually done; and *iii*) an assessment by those who receive the services it provides.

5. IMPACT OF EVALUATION AT UNAM

The internal and external evaluation processes conducted at UNAM have no doubt contributed to an improvement on the quality of a significant number of activities carried out in the Institution. It is however difficult to be precise regarding the results obtained and even more so regarding their cause. Improved quality involves different actions, multiple actors and various processes, and it is impossible to isolate a single cause as the origin of quality enhancement. It can nevertheless be said that the culture of evaluation has established a firm foothold at UNAM, and this section will describe some of the changes which have taken place at least in part as a result of the evaluation processes previously described.

5.1. Academic staff

Evaluation of faculty staff indicates a favorable and sustained improvement of academic quality.

The use of economic stimuli has resulted in greater participation of academics, in the various institutional programs recently established, and in their having the necessary quality requirements. More than two thirds (68 per cent) of the Institution's full-time academic staff (8 672) are currently being supported by the Rewards Program, while in 1990 only 55 per cent received support. With the Incentive's Program for Lecturers and out-time Personnel, 8 893 academics are being supported, accounting for 46 per cent of the corresponding group; in 1993 - the year when the program was put into practice - support was provided to only 39 per cent of the whole group. Through the University Awards, the work of 111 university academics has been recognized, while in the same period, a total of 101 promising young professors have received the University Distinction for Young Academics.

It can also be said that the simultaneous operation of different programs has resulted in a better qualified UNAM faculty. There are two categories for full-time academic personnel: associate and senior; each with three levels (A, B, and C, Associate C being the starting point for someone having a Ph.D. degree, while Senior C is the topmost academic position). Comparing the figures for 1988 with those in 1995, it is possible to conclude that UNAM faculty has had a significant improvement. Today there are many more professors in the higher categories (46 per cent) than before (36 per cent) in spite of the significant increase in full-time personnel.

**Full-time academics by category and level
in 1988 and 1995**

POSITION	1988	1995
Associate C	831	1 748
Senior A & B	1 205	1 770
Senior C	525	802
Total	6 994	9 270

Finally, an ever increasing number of UNAM academics have received external recognition for the quality of their research work. Almost a quarter of its academics are now part of the National Researchers System. More than 40 per cent of those UNAM academics working in research are members of the Researchers System. In fact, UNAM now accounts for a third of all the System members as compared to just over a quarter in 1988. And considering only the highest categories of the System, UNAM accounts for 55 per cent of them.

**UNAM members of Mexico's
national researchers system, 1995**

Level	UNAM Members	Percentage of System's Total
Candidate level	373	24
I	975	32
II	390	46
III	217	55
Total	1 955	33.3

5.2. Students

It is also possible to find examples showing the results of the actions and programs developed by the institution in the processes aimed at improving student academic level. Two examples are the Honours Program and the Diagnostic Exams Program.

a) Through the Honours Program, success has been attained in the greater commitment shown by students to activities considered to be representative of higher academic standards. Figures regarding the participation of first-year students in the program, show that 10 per cent of all first-year undergraduates enroll voluntarily in this program.

Academic results can also be seen in the scholar achievement and grades of the first generation of honours program students: A total of 80 per cent the students completed their course requirements with at least a B grade. All those that completed the program with a major in biology, psychology or engineering are now completing their undergraduate theses within UNAM's research centers, and roughly half of them are interested in pursuing graduate studies.

b) The Diagnostic Exams Program applied in the Faculty of Engineering has resulted in remedial courses being developed in four basic areas. An overall departmental exam is applied upon completion of each course to assess their remedial effect, and it has been observed that students who take these courses obtain better marks in regular courses than those who did not take them, attaining a better general grade average and having a pass rate one and a half times better than those that did not take them.

The general impact of these institutional programs and activities can be seen in the steady progress of undergraduate graduation rates and scholar achievement. The graduation rate has increased by 33 per cent, and general scholastic performance has resulted in 25 per cent more students covering all their course credits in the required time.

Graduation rates at the undergraduate level

Class	83-88	84-89	85-90	86-91	87-92	88-93	89-94
Percentage Graduating	33	32	35	37	45	47	49

5.3. Curricula and study plans

The quest for better curricula and study plans is now an ongoing permanent activity. Several evaluations of UNAM graduate studies showed that changes in structure and content had to be made in order to enable students to complete their degrees in the specified period. These efforts have multiplied and generated momentum, leading to the modification of the whole organization of graduate programs in order to take full advantage of UNAM's staff and facilities to update and make graduate programs more flexible, enabling them to focus on the subjects, areas and topics of particular interest to students individually.

An example of this movement is the Medical Specialization Study Plan carried out by the School of Medicine. Built upon a national evaluation of the residence training received by medical students wishing to become specialists, conducted jointly by the Health Ministry, Mexico's Academy of Medicine and UNAM's School of Medicine, the Study reviewed the state of Mexico's medical specialties. Through the design, validation and application of a national survey on the state of medical residencies, the available infrastructure for courses, its curricula content and orientation, the teaching organization, including selection and evaluation criteria for residents and professional profile and qualifications of teaching staff, the study took into account the results and the recommendations given by experts in the different specialties, and transformed them into curricular aspects to be included in the new Study Plan of UNAM's School of Medicine. It also became the residence program accepted by all medical institutions, and gave several recommendations followed by the heads of medical and health institutions all over the country and by the National Commission for Human Resources in Health (*Comisión Interinstitucional para la Formación de Recursos Humanos para la Salud*).

The parameters considered in the review were: general teaching objectives and educational goals; students requirements for the different academic levels; professors; educational methodology and techniques; teaching contents; educational equipment and material; programs; academic structure and schedules; buildings, physical space and facilities; methods and techniques for student evaluation and professor assessment; research evaluation; administrative bodies and educational policies; financing and educational costs.

The study reviewed 287 courses in 60 different medical specialties, 1 101 professors, 9 708 residents and 101 teaching hospitals in 19 different states. The results were analyzed by 41 expert committees whose recommendations were submitted for discussion to the National Commission's graduate committee and finally approved by the full membership of this body. The new Medical Specialization's Study Plan covering 44 specialties was finally structured at UNAM's Faculty of Medicine and approved by the University Council in 1994. Much progress has been made in putting

into effect all of its recommendations, both in the work programs within hospitals and medical institutions as well as in the curricula of the country's different universities.

Another example of curricular quality improvement concerns the many changes and curricula developments that have taken place through different strategies, instruments and actions starting in 1989; the University Council has approved changes in 54 per cent of the 116 undergraduate programs currently offered; in 35 per cent of the master's, and in 80 per cent of the doctorate's programs.

Curricula development 1989-1995

Level	Total	Changed	New	% Curricula Revised
Undergraduate (68 majors)	116	55	7	53.4
Specialization	74	17	13	40.4
Master's	114	23	16	34.2
Doctorates	45	27	9	80.0
TOTAL	349	122	45	46.3

Note: Total Curricula figure does not include the 10 corresponding to the Open University System.

External evaluation processes have been applied to all aspects of graduate studies at UNAM, noticeably to those in the areas of science, engineering, chemistry and medicine. Many more of UNAM graduate programs are now amongst those that are recipients of students with National Council on Science and Technology fellowships. And in 1995 the University Council approved a completely new structure for graduate studies.

5.4. Research

The institutional effort to support research on the basis of internal fund competition promotes research and development projects that have been subject to strict evaluation and selection processes. Since the mid-1980s, the University has been allocating increasingly greater percentages of its total budget to research activities, and by 1995, this fraction amounted to 27 per cent of its total budget.

As previously mentioned, the Research and Technological Innovation Program that came into effect in 1989 has resulted in a notable increase in the number of applications submitted. Fortunately it has also meant that a growing number of projects, academics and scholarship holders have benefited from this program.

Support program for research and technological innovation projects

	1989	1990	1991	1992	1993	1994	1995
Projects supported	151	152	262	3 144	350	462	552
Academics benefited		1 116	1 464	1 499	3 810	4 985	3 989
Scholarship recipients		319	548	532	835	1 084	1 262

Research conducted under this program between 1989 and 1995 has resulted in 1 680 publications, and 1 618 students who participated in the projects supported received a degree: 1 044 of them received an undergraduate degree; 384 a master's degree; and 186 a doctoral degree. Participants in this program have also had the opportunity of attending conferences and symposia more frequently than they would have otherwise. In 1989, they attended 375 such events, while in 1994 the corresponding figure was 1 824, with a grand total of 6 423 registrations for the period. The inter-institutional academic agreements stemming from such participation rose from 13 to 188.

Research projects conducted at UNAM have always been subject to external evaluation, but year after year outside financing increases. An example of this situation is the support given to UNAM by CONACyT's program to Support Science in Mexico. Strict criteria are applied in the evaluation of applications under this program, amongst them: use of state-of-the-art methodologies, impact on the body of scientific knowledge, repercussions on quality of teaching, in training of new researchers, in the scientific tasks of today, as well as in opening perspectives for science in the future. When this Program began in 1991, UNAM projects supported 70 (3 per cent of the Nation's total); in 1995, 164 were supported, accounting for 26 per cent of the total.

Together with higher quality research, a greater number of research projects have been carried out year after year. In 1995, 4 595 projects were being carried out at UNAM, 45 per cent more than in 1989.

A partial indicator of UNAM's share in Mexico's scientific production can be obtained from the *Science Citation Index*. In 1994 this source of information indicated that 42.5 per cent of all research reported for Mexican institutions came from UNAM. Also, the growing relevance of UNAM's research can be seen from the fact that in 1995, 38 per cent of the operating budget of UNAM's non teaching research units came from external funds provided by public and private institutions.

5.5. Support personnel

Thus far, four evaluation periods have concluded in the Program for Quality and Efficiency on the Job, and close to 60 per cent of the employees have received a bonus as a result of the evaluation of their performance.

The original goal of this program has been achieved by having now as a normal operation an evaluation process on the performance of this group of university personnel, a process previously rejected. However, the evaluation bodies in this program are still prone to consider this program more a means to improve very low salaries than a way to reduce absenteeism and increase productivity in university offices. The evaluation culture in this area of the university still has far to go.

5.6. Facilities and academic infrastructure

In order to assess UNAM's financial request, the Inter-American Development Bank Program conducted a broad evaluation of different aspects of its academic facilities, organization and administration. Various Bank experts in university development, science, technology and financing analyzed the institution both in terms of data, programs, and operating conditions as well as through conversations with government officials, university directors, students and staff.

During a two year period the experts evaluated the situation of the different educational levels offered by the University: the number of students served; the specific traits of curricula and study plans; its graduation rates; the state of its equipment and facilities. In the research areas they also evaluated research linkages with graduate student training and its effect upon undergraduate and pre-university students.

The formulation of the proposal to the Bank meant an extraordinary planning and self-evaluation exercise for the Institution, since an analysis had to be made of its goals, and of the mission and performance of each school and academic unit before defining its needs for equipment, physical facilities and academic personnel training. Before decisions were made regarding the amount of resources to be allocated, the information gathered was submitted to a cost-benefit evaluation process. The Bank's evaluation of UNAM's proposal was positive and the Mexican Government approved a sum of 230 million dollars to be given to UNAM over a five-year period. Almost sixty percent of the resources was allocated for equipment and instruments, a third for buildings and facilities, and the remainder to be used for training.

In 1994 the UNAM-IDB Program began to operate and is currently in its third year. Besides the material benefits the Program will bring to UNAM's academic conditions, particularly in the training of human resources in the scientific and technological areas, the program has already given new impetus to the University as a whole.

5.7. Management

Management at UNAM is an extremely complex process due to the characteristics and size of the institution. The administration is organized through various subsystems in order to have an adequate co-ordination of related activities. In an effort to downsize institutional administration, increase accountability and improve efficiency, bases are being developed to decentralize management, reorganize operations and establish a stronger connection between planning, evaluation and budgeting.

Two examples of changes already under way as a result of the evaluation of management processes are: the Academic Area Councils and the decentralization of administrative processes.

At the end of the 1980s it became evident that UNAM lacked an adequate linkage between its different academic subsystems; for example, undergraduate and graduate teaching were not benefiting from the existence of the many research institutes and centers at UNAM. After an extensive and far-reaching institutional analysis, consensus was reached on the need to have intermediate collegiate bodies between the local academic councils units and the University Council, in order to have effective linkage among the various academic units, subsystems and areas of the University.

The process to set up these bodies was long and made strong demands on a large number of university people. Co-ordinated in a special commission over a two-year period, assessment was made of existing academic structures and knowledge areas; curricular contents; research projects; the background and profile of faculty members, and many other disciplinary characteristics and boundaries in each area were analyzed.

In 1992 the University Council approved the creation of the Academic Area Councils. These were defined as planning, evaluation and decision-making bodies with the task of strengthening the mission of the University, promoting linkage among its different levels, disciplines and academic areas, and ensuring the optimum utilization of institutional resources.

Five Area Councils are currently operating and already play a role in the development of evaluation criteria for full-time academics, in the review and assessment of curricula, and in the new structure given to graduate studies.

In order to improve institutional management, a far-reaching study on UNAM's central administration was conducted in 1994. An external consulting group was placed in charge of the study, and it evaluated the seventeen offices considered to be responsible for the university's operation. The study reviewed administrative profiles, functions, organization and procedures, and diagnosed critical factors in its structures and services. The results also benefited from the opinion and assessment of the academic areas receiving their services or subject to their regulations.

A broad set of recommendations were drafted as a result of this evaluation: *a)* decentralizing operational processes through the development of appropriate structures at the academic unit level, and the application of a systematic approach to validate the local processes, achieve institutional congruency, service differentiated groups of academic units, and heed the policy-setting role of the central administration offices; *b)* decentralizing and modifying the overseeing operation of the Board of Trustees by setting intermediate "comptroller's offices" in the areas and units where such action is warranted, and making their actions a support element of university administration; *c)* develop a central co-ordinated planning and evaluation process by establishing responsibility centers with the active participation of the academic units, *d)* reconceptualize academic marketing to take greater advantage of the different efforts already being carried out.

In addition to these general recommendations, the Study drafted specific recommendations for each of the offices evaluated, all of which are now being implemented.

6. CASE STUDIES

6.1. Curricula and study plans in the school of engineering

The School of Engineering was founded in 1792, and is therefore one of the oldest schools in UNAM. Besides its long-standing tradition, it is UNAM's third largest school in terms of student body, faculty, laboratories, shops, equipment and infrastructure. It is also one of the best in Latin America. It has close ties with relevant production and industrial sectors of Mexican society; its graduates have participated in and contributed to the production of goods, technology development, natural resources exploration and many other aspects of the country's growth. The work of Mexican engineers prepared at UNAM's School of Engineering is widely recognized, and its alumni society is one of the strongest in Mexico.

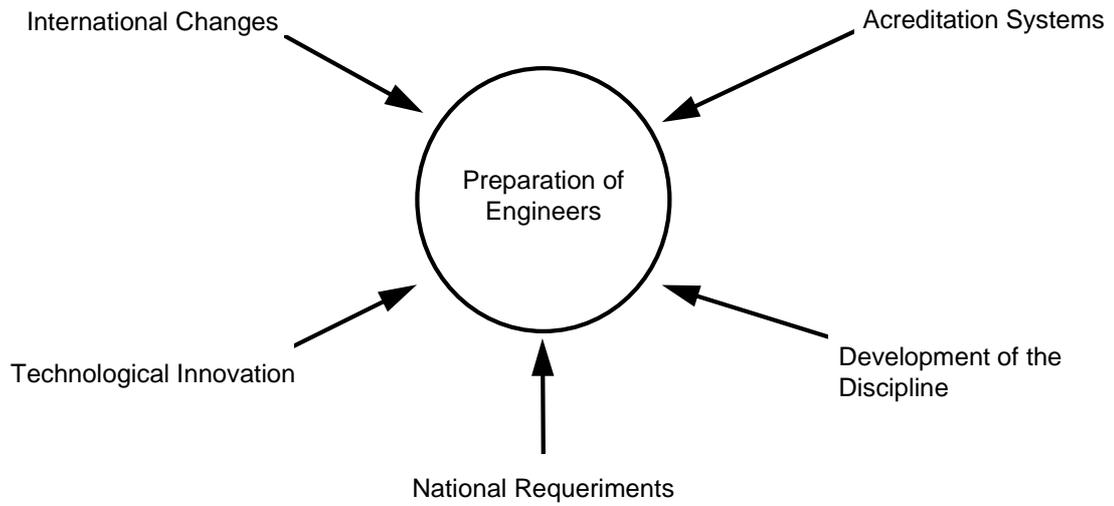
6.1.1. Curricula plans

The School of Engineering currently offers eleven different undergraduate study programs: Civil Engineering, Electrical and Electronic Engineering, Computer Engineering, Mines and Metallurgy Engineering, Telecommunications Engineering, Geophysical Engineering, Geology, Industrial Engineering, Mechanical Engineering, Petroleum Engineering, and Topographical and Geodesic Engineering. The graduate division offers twelve master's and one comprehensive doctorate program. Nearly 10 000 students are enrolled in undergraduate programs while a little over 600 students are registered in graduate programs. For this student population, at both undergraduate and graduate levels, the School has a faculty comprised of 203 full-time professors and 1 045 part-time lecturers.

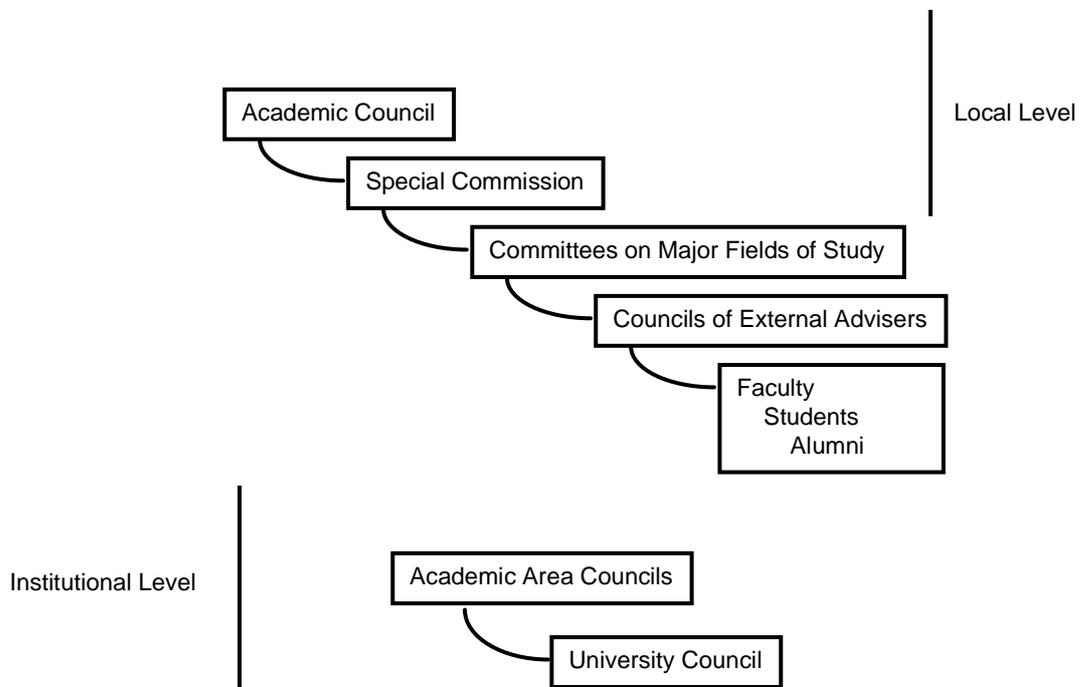
An ongoing process of curricular review updates study programs to new knowledge and professional conditions, thus avoiding their obsolescence. In 1944, 1958, 1967, 1979 and 1990, thorough curricula and academic organization reviews took place. In 1979, committees for each major field of study were set up, charged with the ongoing assessment of curricular content and to have the pertinent changes and updating measures be proposed to the school's academic council. In 1992, external advisory groups were established for the school's graduate divisions. Formed by well reputed external professionals and representatives of the public and private sectors, these groups interact with the above mentioned committees in reviewing and updating curricula.

Between 1993 and 1995, the School of Engineering undertook a new evaluation of its curricula and study plans. The process was carried out in two stages: the first focused on the role basic sciences should have in the engineering curricula, while the second involved adjustments and specific changes for each engineering field.

The evaluation took place within a critical context of international competitiveness and global changes, and their effect or repercussion in the preparation of engineers; of a domestic and international review and development of educational accreditation and professional certification processes as a result of globalization; of an analysis of the development of the discipline and the technological innovations relevant to the field of engineering; and on the face of the many new problems facing society with impact on the different branches of engineering.



The curricular evaluation process followed by the School of Engineering involved the different internal and external bodies that have to assess, recommend and approve a curriculum change at the local and institutional levels.

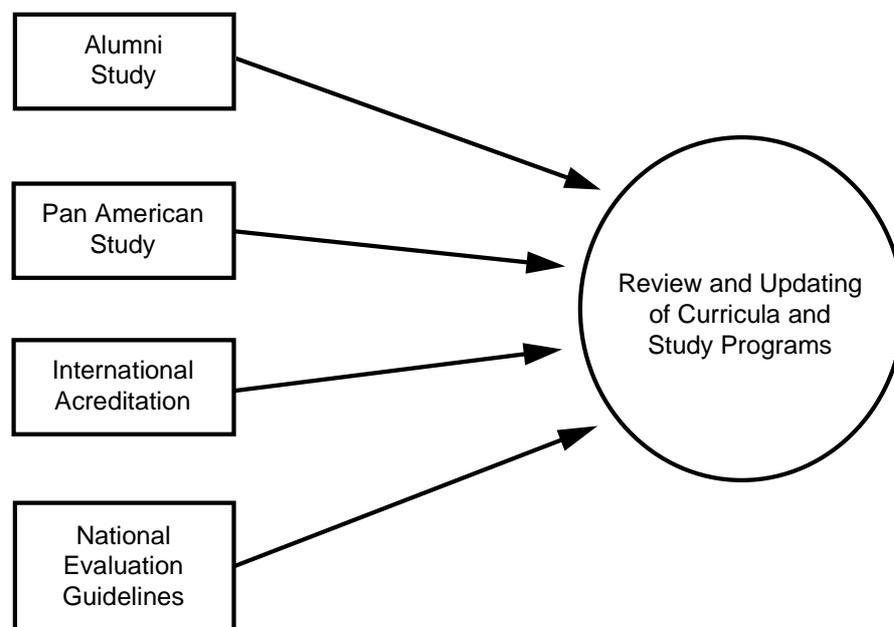


Different inputs were considered in the evaluation, the most noticeable being: results of the Pan American Engineers' Association study conducted in 1991 on the appropriate contents of physics, mathematics and chemistry in the engineering curricula; the career and professional development prospects study conducted by the School of Engineering Alumni; the National Evaluation Guidelines, prepared by the Inter-Institutional Committees for the Evaluation of Higher Education; and the North American Free Trade Agreement, between Canada, Mexico and the United States, which envisages exchange of professional services, including engineering services. The last of these inputs demands accreditation and registration of professional engineering practices as well as a certain amount of homologation in professional training.

In January 1993, the School's academic council agreed to review individual curricular study plans for each engineering field, in order to provide a solid basic education in mathematics, physics and chemistry.

A special commission was established for this purpose . The Commission reviewed the basic contents in an engineers education in the Pan American Study, and which were the result of several meetings held for that purpose. The Commission gave an account of the review process to the School's engineering community, and a group of professors visited several institutions of higher education to learn of their systems, methods, curricula plans and academic organization.

The major field committees sought comments from faculty members, students and alumni as well as from engineers of outstanding professional practice, regarding the congruency of the different curricular components proposed and their relevance to professional practice. They also considered the studies conducted by the alumni association.



The evaluation sequence initially followed was:

In its first stage, the evaluation indicated the program to be outdated, lacking clarity regarding the objectives of the study plan, with content repetition, inadequate use of basic sciences, and an imbalance between core and peripheral topics. These findings generated a structural change of the curricula study plans, dividing their contents in five areas: Basic Sciences, Engineering Sciences, Applied Engineering, Social and Human Sciences, and Complementary Subjects.

The proposed reforms were locally approved by the School's academic council, and in September 1993 were presented to the University Council.

In a second stage, and heeding recommendations made by the University Council, the school's academic council analyzed the specialized concentration courses in nine engineering areas. Several modifications were suggested based on:

- the engineering national evaluation guidelines;
- the approved basic sciences contents, eliminating repetitions and taking care of their merging with the engineering science courses;
- a course sequence appropriate to the order in which basic concepts are first introduced;
- a preferred orientation to the Engineering Sciences so as to broaden education, reducing applied engineering;
- the inclusion of modern topics and state of the art approaches.

The changes thus made were sent to the Academic Area Council and, in 1995, the University Council approved the changes in the specialized concentration courses for the eleven engineering programs.

The evaluation and program renewal process lasted 25 months. Besides the participation of different collegiate bodies at the school and institutional levels, it can be said that the whole school became involved in the process. The fundamental reference points in the evaluation sought to strike a balance between international considerations and benchmarks, and domestic and institutional conditioning factors, the criteria being always that of improving the professional quality of engineering graduates.

In addition, the evaluation and transformation described did not take place as an isolated extraordinary event of the school, but was carried out within a complex policy of institutional development.

6.1.2. Impact

The evaluation of the curricula and study plans at the undergraduate professional level resulted in the following changes:

- *Changes in academic governance.* Academic decisions are now decidedly based on the action and interrelation of various collegiate bodies with different compositions, hierarchies and levels of competence, existing at the school level as well as in the broader context of the University. Within the scope of the School of Engineering, the

external advisory councils now play a relevant role in addition to the traditional functioning of its academic council, and its committees on major fields. At the institutional level, in addition to the traditional role exercised by the University Council, the Academic Area Councils are now in full operation.

- *Curricular Changes.* UNAM's School of Engineering has now eleven new study plans and associated curricula for the following major fields: Civil Engineering, Computer Engineering, Mining and Metallurgical Engineering, Electrical and Electronic Engineering, Telecommunications Engineering, Geophysical Engineering, Geology, Industrial Engineering, Mechanical Engineering, Petroleum Engineering and Topographical and Geodesic Engineering. The objectives in each field, as well as the structure and balance between basic sciences, engineering sciences and applied engineering have been modified in each of the new curricula. The changes introduced are all based on quality requirements at international, national and institutional levels.
- *Changes in Academic Culture.* The opinions and points of view expressed by academics and students on the profiles, objectives and contents of the major fields of study were fundamental in the review process conducted, thus giving the whole community a feeling of the problems faced in curricular modification and an awareness of the challenges posed by globalization.

6.2. Graduate program evaluation

UNAM currently offers 83 specializations, 131 masters and 45 doctoral programs. The Institution is attended by 6 836 students at the specialization level, 4 682 in the master's degree programs and 1 547 in doctoral programs. Its graduate enrollment represents 23 per cent of Mexico's total, and it has 51 per cent of the country's doctoral students. In the 1995/1996 academic year, the University awarded 229 doctoral and 671 master degrees.

Graduate studies organization at UNAM was structured around graduate divisions responsible for study programs at each school, and a General Co-ordination Office for Graduate Studies responsible for the general operating guidelines and student affairs administration, certifying the requirements and credits covered by students.

Each academic unit planned and evaluated its graduate activities locally, through an internal committee in which the division head, the academics and the students all participated. At the institutional level, planning responsibility fell on a Council for Graduate Studies in which all division heads and graduate co-ordinators participated. This organization meant the isolation of each graduate program, without the benefit from the participation of academic personnel from other units outside the school.

6.2.1. Graduate Studies between 1989 and 1995

In the past decade several measures have been taken and programs have been revised in order to strengthen graduate studies and to increase the relations between different University areas capable of collaboration. Recognizing critical areas in their operation and their contents, efforts have been made to renew their profile, modify their structure and introduce new graduate programs.

It is within these efforts and policies that evaluation of graduate programs arose. Between 1989 and 1995, a number of critical reviews and diagnostic analyses were carried out on several graduate areas. The evaluation processes relied both on internal and external assessments of graduate quality programs, covering faculty, students, facilities and graduate program structure. The evaluation processes reviewed two aspects: *i*) curricula and study plans, and *ii*) academic organization and operation, through a sequential methodology of collegiate body participation.

Assessment was generally conducted by collegiate bodies of University members, but Mexican and foreign external groups were also involved. In the internal processes, hundreds of academics participated through the academic local councils at each school or research center, the Council of Graduate Studies, the Board of School Directors and the University Council. External reviewers participated on behalf of the National Council of Science and Technology, the Inter-American Development Bank, the Mexican Academy of Scientific Research, and the National Science Foundation of the United States.

6.2.2. Curricula and study plans

Internal Assessment. Evaluation of curricula and study plans represented a large institutional effort due to the large number of programs to be evaluated, the various academic bodies participating, and the differences in size, complexity, time scales, strategies and actions of the evaluation process. On average 30 graduate curricula were evaluated each year. While assessment was beginning in some areas, in others it was well under way and still in others the process had been concluded.

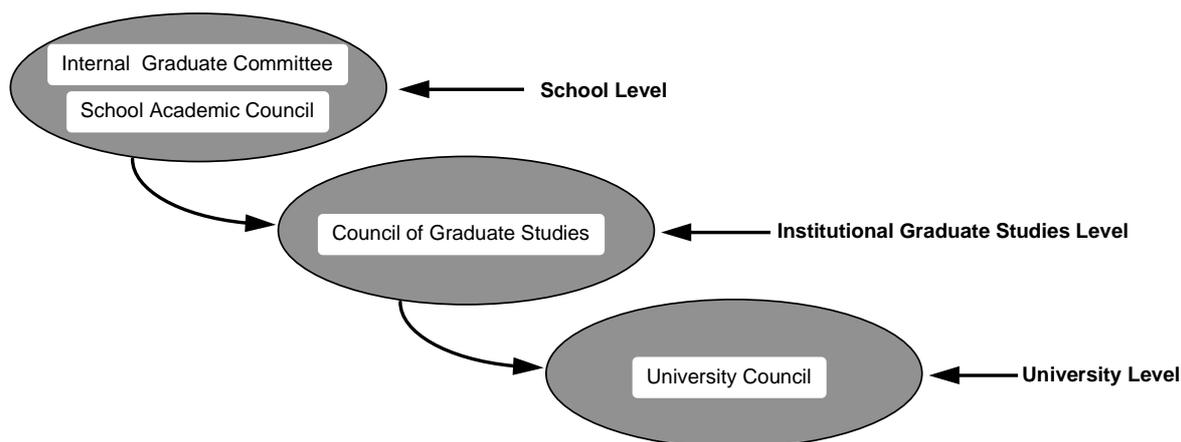
In their assessment of graduate program quality, relevance and efficiency, collegiate bodies took into account the following aspects: social and economical conditions, learning objectives, curricular structure, pedagogical strategy, faculty, patterns in student demand, and graduation rates.

The sequential review action of each of the collegiate bodies involved was as follows:

- Evaluation began at the local graduate committee of each University academic unit. Initial considerations regarding the state of each curriculum and the strategy for its diagnosis were defined at this level. An action plan was outlined, and the goals of the reviewing process were defined based on the opinions, points of views and recommendations of distinguished academics, and on the information gathered for the evaluation process.
- The modified or proposed curricula and study plans were then sent to the local academic council, where discussions took place regarding the relevance, strengths, weaknesses and threats of the recommended changes. In some cases the academic councils requested additional information concerning some changes. This sometimes meant returning the programs to the local graduate committee.
- When the academic councils recommended the approval of new curricula and study plans, the review process was taken up by the Council for Graduate Studies. Its role was a technical one. It reviewed the number of study hours required, the credits involved, the number of academic activities specified, the participating faculty, the admission and degree requirements, and other specifications.

- Once the Council of Graduate Studies issued a favorable opinion, the whole package was transferred to the University Council for the final decision regarding the proposals.

As can be seen from the above description, the evaluation process involved different bodies whose criteria complemented each other to ensure that a strict evaluation was conducted.



As a result of the evaluation undertaken through this process during the 1989-1995 period:

- A total of 232 study plans were updated, representing 74 per cent of UNAM's total graduate programs. Of the 232 curricula updated, 90 per cent affected doctoral, 59 per cent master's, and 60 per cent, specialization study programs.
- Some programs merged to make graduate studies more dynamic, particularly at the doctoral level.
- The educational objectives of all programs evaluated were redefined.
- The program goals were adapted to new socio-economic circumstances in Mexico and the world, including knowledge development, and highly qualified competitors.
- Contents were also redefined so as to take into account major changes in content and balance.
- A radical transformation of all doctoral plans took place moving from a structure based on credits, little research activity, and a heavy emphasis on coursework, to more open structures centered on research activity.

External Evaluation. Between 1991 and 1995 UNAM's master's and Ph.D. programs were evaluated by science committees designated by CONACyT. This external evaluation forced the obtention and organization of information on academic personnel, main research lines and academic projects, number of active students, degrees awarded, scientific output, and facilities and physical infrastructure associated with each graduate program under review.

In their assessment of these aspects, the CONACyT evaluation considered the following components:

- for academic personnel assessment: seniority, academic level, program commitment, research activities, membership in the National Researchers System, scientific productivity;
- in research: number and relevance of the research to the program;
- for students: number of active students, dedication to studies, graduation rates, position of graduates in teaching and research tasks upon completion of their degrees;
- regarding scientific productivity: number of recent publications by academic staff, participation of students in the publications, nature and impact of publications;
- regarding facilities and physical infrastructure: state of libraries, laboratories, workshops and computer services associated with the program.

For their assessment, the CONACyT's evaluation committee relied only on documents provided by the programs under evaluation, and upon completion of their analysis issued one of three opinions: 1) Program approval; 2) Program approval on a conditional basis; and 3) Program not approved.

As a result of this external evaluation process, 38 doctoral and 59 master's program curricula at UNAM were approved and registered as subject to receiving CONACyT fellowship graduate students.

6.2.3. Academic organization and operation

Under the assumption that the academic reforms of graduate curricula and study plans would not on their own provide new momentum to the University's graduate studies, nor would they establish the institutional basis from which to achieve a competitive graduate system with features and conditions similar to those found in well-reputed establishments, a comprehensive reform of the graduate studies academic organization and operation was initiated in 1991.

To this end, the Co-ordination Office of Graduate Studies organized a review of its graduate studies by the institution's Council of Graduate Studies, and also asked for two external reviews, one by the Inter-American Development Bank and one by a joint effort of the Mexican Research Academy and the National Science Foundation of the United States. UNAM was also instrumental in having the Mexican Government request an OECD study of Mexico's Higher Education System.

In 1992, the Graduate Studies Co-ordination Office requested an external examination of the structure, curricula, academic processes and facilities of each graduate studies division. A broad consultation was undertaken by a special committee co-ordinated by the Council of Graduate Studies,

involving the active participation of several schools, the board of Directors and UNAM's Science Research Council.

Partial results were first available in late 1993. The final results, their analysis and recommendations led in 1995 to other efforts and partial changes. Based on the diagnosis thus obtained, the Institution began to build a new view of graduate studies organization in order to achieve increased student enrollment and higher graduation rates. This new organization required changes in regulations and better infrastructure.

The external reviews were conducted while the new view for graduate studies was spreading throughout the University.

In 1993, the Inter-American Development Bank started a comprehensive examination of the University's graduate programs, which included an analysis of their structure, curricula, relevant regulations, enrollments, faculty staff and available infrastructure.

The analysis was made within the context of the University's Development Plan and considered measures to strengthen faculty staff, update curricula and study plans, improve library and computer services, increase research activities, and promote the interaction between academics and students through financial incentives.

The Bank evaluation indicated the need to have UNAM's potential for top-level graduate studies be made to contribute, rapidly and decisively, to the development of more graduate programs for the country. It also showed that graduate education at UNAM offered high cost/benefit advantages. The Bank experts made the following recommendations:

- develop programs to stimulate demand for graduate studies, particularly those in the scientific and technological areas, given their relevance for Mexico's development;
- reduce the time taken necessary for obtaining a degree so as to improve the impact of graduate studies in society;
- increase the number of students completing their degrees;
- improve facilities and overall conditions for graduate students.

As a result of the Bank evaluation, in 1994 the University initiated a large investment program, improving libraries, workshops, laboratories, classrooms and other facilities for graduate courses, as well as acquiring new specialized research equipment.

In 1994 and 1995, Mexico's Academy of Scientific Research (*Academia de la Investigación Científica*, or AIC) and the National Science Foundation, NSF, of the United States carried jointly an external review of UNAM's graduate study programs. The review was centered on four areas: Science, Chemistry, Engineering and Medicine.

Each area was reviewed by a specialized AIC-NSF committee, based on: 1) information concerning the area's structure, collegiate bodies and organization, 2) fundamental statutes and regulations for each curricula; 3) curricula for the selected master's and doctoral programs, including academic activities, admission procedures, associated faculty, student population, doctoral dissertations,

facilities, grants, scientific production and linkage mechanisms; 4) student population data; and 5) tutor's curricula vitae.

The committees evaluated the areas using three specific criteria: faculty quality, quality of curricular study plans, and quality of physical infrastructure and facilities.

6.2.4. Impact

A number of the recommendations suggested by the internal and external examiners have been adopted. For example, those oriented to: having more full-time students, simplifying curricular plans, making them more flexible and reducing overspecialization; promoting common basic courses; reviewing admission requirements; revising program objectives in order to attain leadership and competitiveness; having more tutors earn a Ph.D.; making doctoral programs more dynamic; diversifying faculty; expanding research areas; forming and recruiting new academic staff; facilitating and increasing the use of infrastructure by students; fully taking advantage of institutional facilities; and periodically evaluating graduate curricula and study plans.

As a result of all the review and evaluation processes previously described, a whole new structure for graduate studies was devised. In December 1995 the University Council approved the new general rules for graduate studies at UNAM. These imply:

- the articulation and integration of various academic University entities (faculties, schools, institutes, centers) and their academic personnel, in joint and shared graduate programs;
- the creation of new collegiate bodies: (“academic committees”) to design, propose and conduct specific doctoral and master programs;
- the strengthening of a real tutorial system;
- the flexibility to shape a graduate program to each student's needs, while ensuring quality;
- the opening of new graduate study spaces (inter and multidisciplinary), thus providing for growth in graduate studies according to the Institution's potential and the country's needs.

The Institution currently has a modern, dynamic and creative view of graduate studies and the corresponding legal framework, validated by the university community. A set of measures is now in process to improve and strengthen the infrastructure and equipment of all units participating in this level.

The changes introduced have had an impact on the institution's government, on the way in which academic and administrative decisions are taken, on curricular structure, and on UNAM's academic culture.

As previously indicated, there will be an academic committee within each graduate program responsible for student admissions, length of stay in the program, decisions regarding thesis approval, tutors and advisors, program content modification and academics participation in the program; they

will also be responsible for annual evaluation and planning. The various existing graduate study councils and committees will be transformed according to the new structure but will keep their role as bodies where proposals are made and discussed for the creation, modification, cancellation and evaluation of graduate curricula and study plans, and opinions are heard regarding graduate program operation and their linkage with research programs.

Changes in Decision-Making. A different decision structure has been established in the governance of the University's graduate program. Decisions will now be adopted collectively and by a group of academics not belonging to the same department, school or institute.

Changes in Curricular Structure. The curricula evaluation carried out in 1989-1995 has resulted in a redefinition of program goals; in updating and reorganizing the contents and nature of the academic activities required; in strengthening the role of research in graduate studies, and in fostering a stronger student-academic interaction through a more strict tutorial system.

Changes in Academic Culture. The evaluations have also brought major changes in the general academic ambiance of the University. Although this is at present limited to the graduate studies community, it is expected that it will later extend to other levels and areas of the Institution.

CONCLUSIONS

To fully understand the results of the programs and measures that have been implemented in the last years, one must bear in mind that UNAM had experienced a crisis with serious consequences for academic life. Within this context, the institution redefined its goals in 1989, and established a course of action to restore its academic essence and regain quality in each and every one of its activities, areas and services. The multidimensional and holistic reform policies were aimed at meeting these objectives gradually; not on a crash course which had very little chance of success and would certainly demoralize, demotivate and alienate significant sectors of its community.

The University decided rather, to motivate its academics through programs designed, formulated and explicitly initiated to expand their horizons, but according to a critical path design which at the same time led to the reawakening and consolidation of academic concerns. Concrete measures were taken, all framed within the characteristic participating style of decision making at UNAM, to set the guidelines for the development of the institution, renovate its management policies and plan an ongoing and systematic evaluation of its members. Measures were taken along these lines for an administrative reorganization of the institution that would allow a more efficient use of resources, a more expedient paperwork, the modification of job standards, the updating of curricula and study plans, the modernization of support facilities for academic endeavors, alternate sources of financing, and a change in the declining image the University was experiencing.

The University was in essence redefining its concept of quality, and doing it based both on its own characteristics and reality, and on the concepts and paradigms from other countries and institutions. Quality was encouraged more through the previously mentioned institutional measures and programs than through changes in by-laws and regulations. In this sense, the consolidated holistic approach and the evaluation system were able to integrate features and dimensions which combined tradition and innovation, and led to an integral increase in quality within the Institution.

Today, when some of the programs described have been running for almost seven years, the basic academic structures of the University have been re-established and the academic goals and culture have been reinforced, more in-depth reforms of academic life can be attempted.

Collegiate decision making is a central element of UNAM's management style. The strengthening, consolidation and establishment of collegiate bodies represents the essence of the various academic entities and sets the conditions of plurality, complementarity, rigorousness and goals that have to be taken into account when managing the academic affairs of the University: its educational curricula and study plans, its strategies, its research priorities and goals; the measures, programs and areas to teach and train its students; the processes it develops and implements to recruit and promote academics, and many other aspects that conform and define university life.

The collegiate approach has permeated all aspects and areas of the university; those collegiate bodies that existed have been reinforced, others have been created, and the working structures and management policies of all have been reaffirmed. This approach has been pursued not only out of pragmatic considerations, but also with the conviction that it constitutes an authentic and legitimate form of managing an institution whose mission evolves around education and knowledge.

A revitalization of structures and conditions suitable for academic staff has also resulted from the programs and measures established, enabling academics to concentrate their interests, efforts and commitment once again to the core activities in a university.

Although it is true that UNAM has had evaluation schemes and procedures at least since the turn of the century, the evaluation procedures recently introduced with the consensus and participation of all academics are more numerous and broader in scope. Therefore it can be said that through their action, the evaluation culture at UNAM is a permanent and active part of academic life.

As a result of the impact of the programs started and the measures taken and sustained since 1989, students are beginning to experience an improvement in their training. The renovation and modernization of library services, the extension and availability of many more computers and computing services, the development of strategic academic and other programs have laid the groundwork and set the necessary conditions for a more rigorous and solid academic preparation of students.

It is important to point out that quality improvement is also having an impact on student demand and on the selection and admission processes at UNAM; on reducing the lengthy bureaucratic processes related to curricula reform, graduation requirements and other aspects of undergraduate and graduate teaching. The successive and complementary evaluations carried out at the graduate level have modified the vision and organization as to what constitutes a solid and relevant training. This new structure rests on a scheme of closed interaction amongst academic units, of collegiate operation, and of making good use of the best academic and research personnel and facilities within the Institution.

The efforts to lay the groundwork on which institutional management can change into a dynamic academic structure with new criteria and working conditions can also be appreciated. The impact of academic evaluation and the subsequent reforms stemming from them have placed new demands on management. Internal and external reviews regarding management have led to administrative reforms in the management of human, material and financial resources that are gradually turning a centralized system into a decentralized one.

One could also conclude that the varied and multiple evaluation processes applied to academics, students, curricula, research activities, operation and management structures have begun to bear results in the shape of a new awareness by the community of the challenges the University faces at national and international level, and of the fact that these challenges demand a more powerful and competitive educational system, based on an equally competitive institutional performance.

This greater awareness by the university community represents the necessary conditions for a greater and more precise social commitment. The global effect of the evaluation approach assumed, will result in a new assessment paradigm that will take into account inputs, processes and outcomes.

The evaluation approach adopted has been characterized by a diversity of programs whose cohesion and force, given by the institution leaders, have provided the University with the necessary structures and quality conditions to transform the academic and management structures throughout the Institution.

The efforts required to move forward now require a change of strategy, one based on policies, programs and efforts to:

- balance the University's missions, particularly teaching and research;
- assume accountability (academic and administrative) as the new paradigm;
- establish a federated system.

UNAM should blend harmonically its two main missions: the preparation of human resources of high academic and professional quality, and the production of knowledge in science, technology and the humanities.

Accountability should replace quality as an evaluation paradigm for the Institution as a whole, affecting each and every academic unit, collegiate body, or administrative office. Specific indicators and specific quantitative and qualitative evaluation indexes should be established. An integrated dynamic process for planning, budgeting and evaluation must be put into operation, thus strengthening the strict exercise of institutional autonomy while making the University openly accountable to society at the same time.

In addition to technological modernization and decentralization processes, a change is required in the administrative and academic structures and in the decision-making process to increase administrative efficiency and to be able to respond to new demands by society. Academic development should be achieved by giving UNAM a federated structure with academic goals as the cornerstone of its decision-making processes; promoting functional and flexible collegiate decision making; facilitating the use of the accountability concept as a fundamental parameter of evaluation; and enabling each of its academic units to develop their full potential within an organized institutional framework.

Due to the nature and sheer size of the Institution, the management and evaluation schemes here summarized may be seen as being extremely complex and difficult to assess. However, processes and mechanisms are already in operation that point to progress achieved in academic and administrative matters, and that will detect deviations in time to apply corrective measures.

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