TOWARDS A SYSTEMIC EVALUATION FOR GRADUATE ACADEMIC PROGRAMS IN MEXICO

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ABSTRACT

The level of development of quality life reached by a country is directly related to the quality level of the higher education offered in its institutions and universities. Particularly the quality of Doctorate programs where research and innovations are promoted, the results can be demonstrated by reviewing the research papers published in international journals, and the registered patents which eventually become goods or services that allow more welfare for the population among others.

In Mexico, the National Council for Science and Technology (CONACyT) is the responsible to guarantee the quality of graduate programs by the means of a periodical evaluation program, but it has been identified that such evaluation is very subjective, and therefore CONACyT along with other Government Institutions are in the process of acquiring abilities in order to perform a better evaluation system for Graduate and Postgraduate education in Mexico.

The literature review on systemic evaluation showed that most of the papers reviewed so far, focus mainly on the design of evaluation methodologies for industrial processes in which the quality is defined very well, according to the features of the inputs that go through a standard process producing a standard output. But none of the reviewed papers mentioned which are the main quality attributes in the case of academic evaluations. This shows the need to develop a more appropriate evaluation methodology for Postgraduate education in Mexico.

The evaluation methodology can be designed based on a systemic approach with an anthropocentric perspective since they are sociotechnical systems in which human interaction is a very important element. Also, the methodology can include the systemic attributes required to consider an academic program pertinent from an anthropocentric perspective.

Keywords: Systemic evaluation, graduate programs, methodology.

INTRODUCTION

Evaluation is an activity that has taken place since mankind appeared in the Earth, but as a concept it was born around the first decades of the 20th century as a synonym of measuring. In the 1930's Tyler (1967) coined the concept of "educational evaluation" and developed an evaluation method focused on the establishment of goals and defined evaluation as something that determines whether the goals are reached or not. Therefore, it can be seen that the method is focused on the level of success, and goes against indirect

methods to establish the quality level in education teaching through the books quantity, didactic material, and participation in the community, among others. By 1949 Tyler moved its thoughts from evaluating the skills of the individuals to the curricular design, then the evaluation became a mean to knowledge the level in which the intentions of the curriculums were actually reached (Tyler, 1950).

At the end of the decade of 1970, Metfessel and Michel (1967) retook Tyler's model and elaborated a list of assessments criteria in order to use the evaluation program. The development of the criteria represented a progress in evaluation design; nevertheless, the paradigm remained. Latter, the authors accepted that their model could give wrong results, reason why caution must be given to the used of their approach and canniness are indispensable in order to get honest and meaningful conclusions from the evaluation.
In 1970 Suchman proposed that evaluation should apply the scientific logic method. He considered that evaluators should use every kind of research techniques that can be useful and appropriate for the circumstances and needs for a particular evaluative case. Suchman defined the difference between evaluation and evaluative research, the first was defined as a process to express value judgments, while evaluative research is the process of gathering and analyzing data to increase the possibility of demonstrating the value of some social activities.

For Cronbach (1982), planning evaluation is an art since each plan should be decided by (1982) taking into account whether is appropriate or not for each duty, it can be seen that Cronbach (1982) understands the planning as a problem of distributing research resources base on political and practical considerations. Cronbach (1982) proposed that in order to turn an evaluative work into a study program, a mixture of styles between the scientific method and the naturalist holistic one could be convenient. From the above, it was shown that Conbach work (1982), considers the evaluation a mean to accelerate the learning process by communicating which in other way would be misunderstood or not understood at all. Conbach (1982), concluded that evaluation must have a scientific activities core in order to get realistic observations and conclusions, which should indicate what would happen if a certain intervention plan is applied in a specific situation; then the conclusions should be valid, persuasive and work as predictions.

Stufflebeam (1987) proposed the Context Input Process Product (CIPP) model in which it is emphasized a program improvement and the importance of submitting the evaluation work in order to perform evaluation through a metaevaluation technique. Stufflebeam (1987) established that the purpose of evaluation is not to prove but to improve. Thereby, he defined evaluation as a process of identifying, gather and give useful and descriptive information regarding the value and merits of the goals, planning, performance and the impact of a specific goal in order to work as guidelines for making decisions, solving problems and understanding the implicated phenomena.

The need to define quality and educational quality remains, for Gago (2005), "quality is the synthesis of the attributes, features, elements, and expressions, making a difference between positive and negative aspects through a value judgment"; Seibold (2000) "quality considers every attribute in a product or service when its tangible and intangible features

satisfy the needs of a user", this definitions still have components of quality definition of an industrial process.

In the search of a definition of quality evaluation, Owila and Aspinall (1996) classified quality by incorporating concepts and dimensions in three different groups: technical quality, functional quality and corporative image quality. These authors considered that features related to technical quality are those that can be measured regardless the client's opinion, while features related to functional quality are related to the interaction between supplier-client. Corporative image quality is the sum of the perceptions clients have about the company and the technical and functional quality. They also recognized the difference of products and services presented; services have features as intangibility, simultaneity and heterogeneity, which can be applied in education as well. Based on this idea, Owila and Aspinall (1996) tried to build a definition of quality through a comparison table with in which they placed features of the industrial environment and then tried to apply it to the higher education evaluation, they were able to place industrial features in education but this is not accepted in academy therefore, academic quality was no defined yet.

Lgrosen *et al* (2004) considered that in higher education, a quality control hasn't been reached or has been diluted due to freedom given in the academic exercise and the diversity of points of view regarding this issue. These authors retook the quality definition given by Juran (1988), which states that quality is focused in satisfying the clients and, client is whoever's affected by the company activity. In order to limit the study they made the set the stakeholders as the client.

In social sciences, quality is one of the most difficult concepts to be defined, for Garvin (1987), quality is a simple feature, which cannot be defined but one can learn about it only through the experience. Frazer (1994), considered that the first step to define quality in higher education is to state in an international level some terms as standards, efficiency, and effectiveness, among others. Mizikaci (2006) proposes to establish quality systems for higher education due to the increasing interest in getting quality accreditations. From the above, it can be observed that the main issue still remains: "what is quality in higher education?" For many years several definitions, born in the industrial environment regarding quality, have been applied in higher education evaluation showing large limitations in evaluation processes Mizikaci, (2006). Despite of the intention of applying a systemic approach for evaluation, this author didn't reacg a model with a holistic view and ended up bringing a TQM structure without any systemic conclusion. Stufflebeam and Shinkfield considered higher education evaluation as a system and the inputs and output processes are the aspects to be evaluated. However, the focus of quality still differs in the concepts of management and the program itself emphasizing the client satisfaction when selecting data sources and therefore making decisions.

For the last two decades, the application of the Total Quality Management (TQM), in higher education evaluation has shown poor results; nevertheless, the application of this tool has been reinforced in order to promote education improvement. Houston (2007b) described how TQM was born in the industrial environment in order to warrantee quality in the productive processes; gradually the tools and methods of the TQM have been applied in other processes of the companies. But many of the terms part of the TQM methodology do

not actually fit in the higher education environment. Then, Houston (2007b) proposed the application of the Evaluation Capacity Assessment Instrument (ECAI); but this tool requires training, technical assistance, consulting and other activities for some of the members of the organization staff. It was observed that the aim of the ECAI is to document in regular bases the implementation of the evaluation programs, interpret the results obtained in order to strength the implementation and improve the results.

In other perspective, Chen (2010) reviewed Campbell's theory, which has influenced the development of methodologies, and other theories. Such academic research model aims to evaluate academic programs and identifies two main validations: internal and external. The internal validation asks if in the specific instance, the intervention is making any difference; while the external one asks about the possible generalization of the experimental effect. Since both validations, internal and external, have an inverse relation Chen (2010) highlights the importance of the internal validation. For Chen (2010), despite the fact the Campbellian evaluation model works for research, in the program evaluation it was not useful, mainly because it doesn't takes into account the stakeholders point of view. Rezeanu (2011) recognized that the importance quality has currently and retakes TQM to check it. She considers that quality can only be warranted by the application of a managing system that brings the evaluation unlikely.

Berrier-Solliec *et al* (2014) mention the soft systems methodology designed by Checkland should be applied although they consider it lacks a verification stage and the stakeholder's' opinion should be taken into account. The authors discussed repeatedly about the importance that quality has when evaluating, but they stated that the definition will depend on what the evaluation is for; but once again, no definition for quality was provided.

From the literature, it was observed that the problem regarding quality in higher education is an abstraction of the "mess" of the interacting problems. Therefore, the systems concepts, a systems approach and a systemic analysis can help to solve the mess and review the utility of the TQM methodology as a pertinent approach to solve it as well, since a systemic approach allows dealing with all these parameters, the interconnections and the emergent properties of complex situations (Houston, 2007b) as the systemic thinking is based on valid knowledge and understanding approaches of the whole framework of the phenomenon, instead of dividing it.

The Critical Systems Thinking (CTS) incorporates these fundamental commitments to the consciousness and reflection about methodology, pluralism and improvements, which can be understood as "producing the circumstances in which every individual can reach its potential" (Jackson, 2000). The critical conscious and the commitment with improvements, promote the understanding of strengths and limitations associated to the approach to the given problem-solution convenience for the particular context of the problem. The spirit of the CTS has to make a critical and reflective review to all that has been taken for granted such as quality in higher education. In the attempts of applying the TQM as an approach to solve the problem, it seems that this model has been taken as a good approach without considering its elements, relations and adjust in the context of the problem, particularly the one of the higher education for the present work. There is very little agreement about if TQM keeps the systemic integrity as approach to solve the problem (Houston, 2007b). The

approach to evaluate Higher Education Institutions must move from being a market or economic element to a social organization. Therefore, applying a methodology that was not born at the academic environment may have been more trustworthy for stakeholders, but for those who participate in the internal higher education processes the need of counting on a methodology to evaluate the quality of higher education, has not been satisfied to the date, so far only reductionist and lineal approaches have been offered.

METHODOLOGY

Soft systems methodology is an appropiate one to approach problematic and unstructured situactions in the real world related to the human activities systems. This can be better undestood by using the framework for classifying systems methodologies developed by Jackson and Keys in 1984, called the Systems of Systems Methodology (SOSM).

Table. 1 Jackson's extended version of Jackson and Keys' "ideal-type" grid of problem context

SYSTEMS	Unitary	Plural	Coercive
Simple	Simple-Unitary thinking/hard systems methodology	Simple-Plural Soft systems approach	Simple-Coercive thinking/ emancipatory systems methodology
Complex	Complex-Unitary Systems dinamic, organizational cybernetics, complexity theory	Complex-Plural Soft systems approach	Complex-Coercive Postmodern systems thinking

Source: Jackson (2003)

In this framework the evaluation system under study can be located in the intersection between complex and plural systems, therefore, the methodology that will be applied to approach this system Checkland's. This methodology has 7 stages, namely:

1. The problem situation unstructured
2. The problem situation expressed
3. Root definitions if relevant systems
4. Conceptual model
    - 4a. Formal system concept
    - 4b. Other systems thinking
5. Comparison of four with two
6. Feasible and desirable changes
7. Action to improve the problem situation

In the present work stages from 1 to 4 will be addressed.

STAGE 1. THE PROBLEM SITUATION UNSTRUCTURED.

The evaluation system is a part of a metasystem with three levels namely:

I. *The international environment*. At this level there were found the more important international organisms that directly influence the evaluation system, they are: Organization for Economic Co-operation and Development (OECD), the United Nations Organization (UNO) and organizations that derive from this one like, United Nations Educational, Scientific and Cultural Organization (UNESCO), International Monetary Fund (IMF) and the World Bank (WB).

II. *National environment*. Correspond to institutions and/or elements with important influence in México, they are: the Presidency, the Senate of the Republic, the Chamber of Deputies, the Ministry of Education, CONACyT, among some others.

III. *Evaluation environment*. The elements that participate directly at evaluation process are found, namely: Institutions of Higher Education, Researchers-Academics at the graduate programs, Academic Programs and the Coordinators of the Graduate Programs.

At the frontier between the first and the second level, there were found several elements that participate and are involved in the evaluation process, they are: among others, Mexican Council for Graduate Studies and the Undersecretary of Higher Education. Some of the elements that participate in the three levels are: CONACyT, the Labor System and Academic System. The following figure shows a model of the rich vision of the problem.

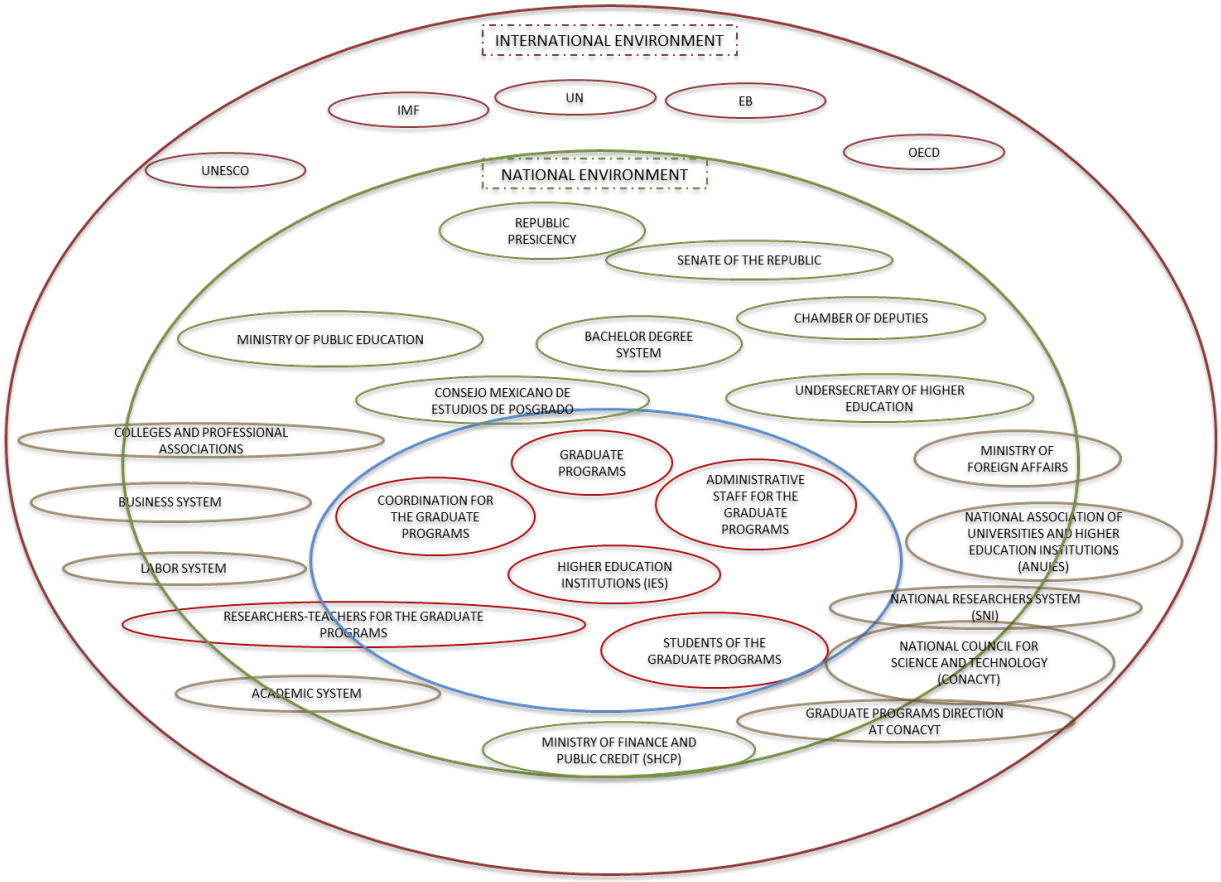


Fig. 1. The under study problem definition

UN: It's defined as an association of global government that establishes quality standards for human development, among others for education.

UNESCO: Its mission is to contribute to peace consolidation, the poverty eradication, sustainable development and intercultural dialogue through education, science, culture, communication and information.

WB: It is a source of financial assistance for the countries under development. Its purpose is to reduce poverty through low interests loans and economic supports.

OECD: It's in charge of promoting politics to improve human development.

IMF: Promotes financial stability and international monetary cooperation.

Republic Presidency: Among many others, has the responsibility to name Secretaries of State like the Public Education one and the director of the National Council for Science and Technology (CONACyT).

Senate of the Republic and Chamber of Deputies: Represent the legislative power and influence in the development of education, science and technology.
Ministry of Education (SEP): It is the responsible for the educational system at national level.

Undersecretary of Higher Education: It depends directly on the SEP and is in charge of the higher-level education management at national level.

Ministry of Foreign Affairs (SRE): Contributes to the development of higher education in the country through de management and development of foreign affairs.

Colleges and Professional Associations: Identify upgrade needs in the formation of new professionals in each area of knowledge, and proposes specialization guidelines considering technological and scientific advances.

Academic System: Considers the higher education institutes and its members.

Business System: It's constituted by all the business, of private capital and can be benefited with the formation of high-level human capital.

Labor System: Most students are incorporated to this system after graduate programs to perform remunerated economic activities.

National Association of Universities and Higher Education Institutions (ANUIES): Agglutinates the public and private higher education institutions and promotes the improvement in their management.

National Council for Science and Technology (CONACyT): Is responsible for designing and implementing strategies to promote scientific and technological improvement in the country.

Graduate Programs Direction at CONACYT: In charge for the management and operation of the PNPC.

Higher Education Institutions (IES): Are responsible for identifying the needs of formation, designing and implant high quality academic programs to satisfy the society needs in general.

Researchers –Teacher for the Academic Programs: It is the staff that participates in every stage of the graduate program, form design creation up to operation.

Coordination for the Graduate Programs: It is the responsible for the management and administration for each graduate program.

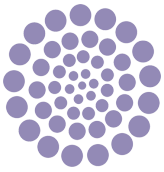
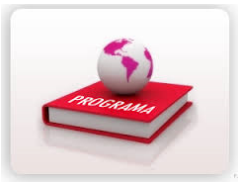
Graduate Programs: They are the evaluation subjects and the mean of transformation of students.

Administrative Staff for the Graduation Programs: Are responsible for the management of the graduate programs.

National Researches System: Organism that is part of the CONACYT, it agglutinates the national and foreign researchers who participate as evaluators in the evaluation process for the graduate programs.

STAGE 2. THE EXPRESSED PROBLEM SITUATION

Table 2. Iconographic Representation of the agents, part of the object of study and of its environment.

Icon	Element	Icon	Element
	United Nations (UN)		National Association of Universities and Higher Education Institutions (ANUIES)
	United Nations Educational, Scientific and Cultural Organization (UNESCO)		National Council for Science and Technology (CONACyT)
	World Bank (WB)		Graduate Programs Direction at CONACyT
	Organization for Economic Co-operation and Development (OECD)		Higher Education Institutions (IES)
	International Monetary Fund (IMF)		Researchers-Teachers for the Graduate Programs
	Republic Presidency		Coordination for the Graduate Programs
	Senate of the Republic		Graduate Programs

	Chamber of Deputies		Administrative Staff for the Graduate Programs
	Interior Ministry (SEGOB)		National Researchers System (SNI)
	Ministry of Finance and Public Credit (SHCP)		Ministry of Public Education (SEP)
	Ministry of Foreign Affairs (SRE)		Undersecretary for Higher Education
	Colleges and Professional Associations		Business System
	Academic System		Labor System
	Students of the Graduate Programs		Mexican Council for Graduate Studies
	Bachelor degree System		

The structured problem shows different relationships, some of which are conflictive. The students are considered the more relevant system because the whole phenomenon happens around them and if they didn't exist in the system, the whole system would lose the reason to exist.

The students have conflictive relationships with several other elements such as: Researchers-Teachers, Administrative Staff for the graduate programs, the Coordination of the graduate programs, the Higher Education Institutions, CONACyT and the Graduate Program; all these components are responsible of the students having a pertinent graduate program provided with every academic, technological and administrative resource required to get the knowledge needed to solve out problems society suffers.

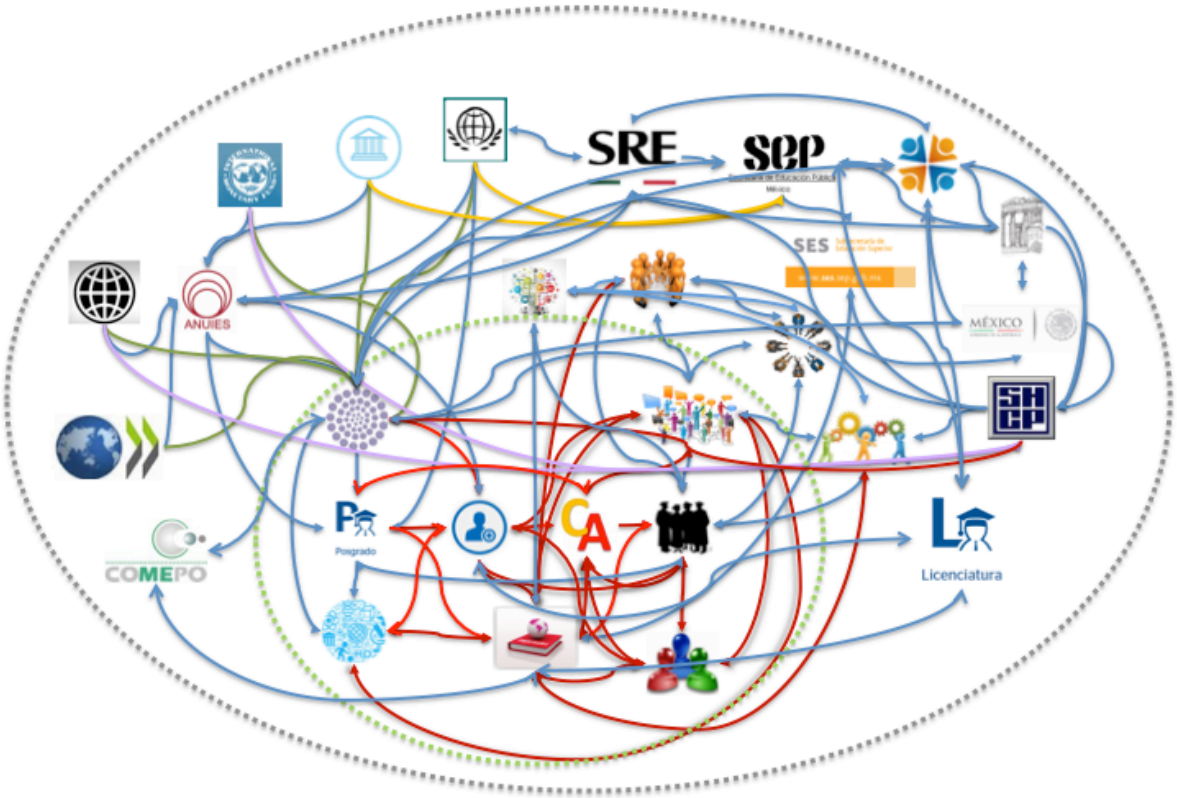


Fig. 1. Rich picture of the problem

STAGE 3. ROOT DEFINITION OF THE RELEVANT SYSTEMS

For the root definition stage the CATOWE was applied.

C*lient*: The students and candidates to enter the high quality graduate programs.

A*gent*: The Graduate Programs Direction at CONACYT and the IES that propose the graduate programs to incorporate to the PNPC.

T*ransformation***:** The inputs are Graduate Programs that perform a self-evaluation of the conditions they have. The outputs expected are rejected graduate programs that will know opportunity areas, graduate programs in development, consolidated graduate programs and international level graduate programs.

O*wner***:** Methodology owner is the Graduate Program Direction at CONACYT, it is the actor that will apply it during the procedure to incorporate or remain graduate programs in the PNPC.

W*eltanschauung* (world vision): To obtain the world vision an unstructured instrument was elaborated and applied to the actors involved in the evaluation process in order to get their perspective regarding the application of an integral evaluation methodology.

The results are shown in the table 3.

Table 3. Weltanschauung (world vision)

Agent	Positive visión	Negative visión
Graduate Programs, Direction at CONACyT	Certainty of impartiality in the evaluation process	Resistance to change
	Peripheral Component integration to substantive activities	Train the staff to apply the new methodology
	Encourage the incorporation of graduate programs at PNPC	Reestructure the evaluation system
	Promote the development of graduate programs at the international level	New financial investment
IES	Identification of areas of opportunity	Resistance to change in the presentation of the indicators and their type
	Cycles of continuous improvement	Investment in graduate programs
	Spread recognition of program quality	Staff training
	-	Hiring administrative staff with ad hoc profiles
Graduate programs students	Recognition of the quality of the graduate program	Requirement at the level of academic performance
	Academic level	-
	Quality level of the academic core	
	Possibility of joining the labor system	-
Personal Administrativo	More training	Modification of certains rules for program management
	-	Resistance to change

E*nvironment*: An environment review was performed found consistency, with what was considered in stage 1. Nevertheless, a non-incorporated component was identified which corresponds to the graduate students. For a suitable systemic evaluation performance is necessary to count on this component's opinion, which is considered also an outcome of the system.

CONCEPTUAL MODEL

A first approach to the conceptual system can be seen in figure 3 in which the actors that participate in the evaluation process are identified. It can be seen that subsystems were also identified in this approach:

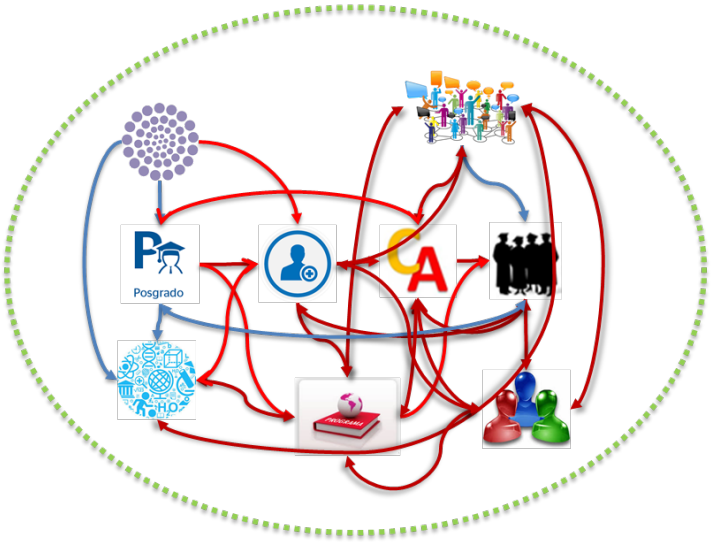


Fig. 2. Structured Problem Situation

1. *Teach-learn system.* In this point, the components of this system are the students, the researchers-teachers and the graduate program. Therefore, the students and the researchers interact through the graduate program and its content. The expected outputs of this system are high-level professionals with capacity to approach and solve problems the society suffers about.

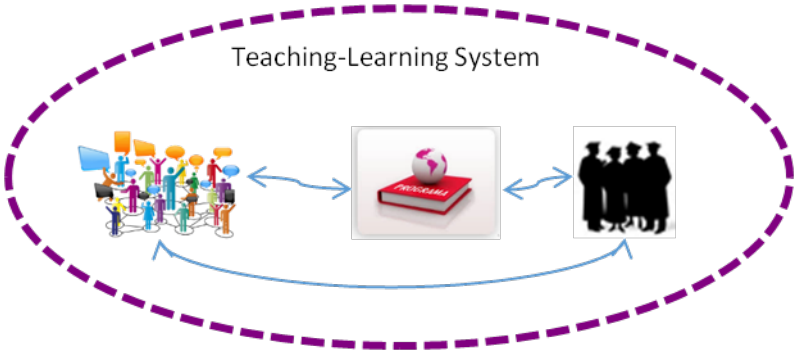


Fig. 3. Teach-learn System

2. *The Academic Management System.* In this system participate the administrative staff, researchers-teachers, students and the coordination of the graduate program. The management of each graduate program is operated and it is in charge of having every paperwork done according to the guidelines. Figure 5 shows the academic management system developed for the present work.

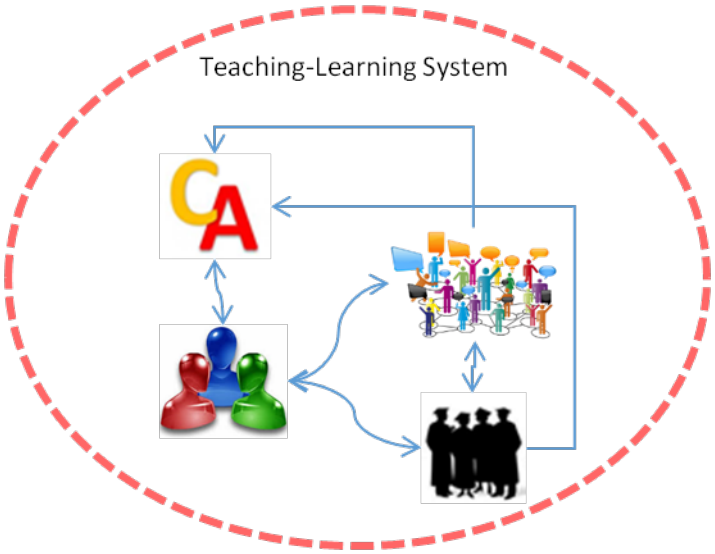


Fig. 5. Academic Management System

3. *Academic Designing, Planning and Evaluation System*. It is organized to design, establish all the needs to operate a solid and relevant graduate program, and evaluate the results and outcomes to improve it. In this system the elements identified are researchers-teacher, the coordination for the graduate program, the higher education institutions and the graduate program. Figure 6 shows the interaction of the described actors.

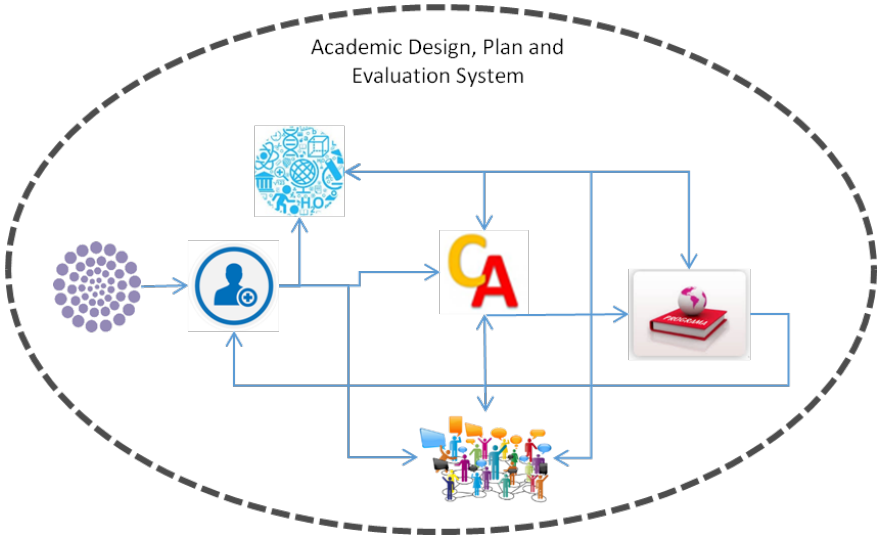


Fig. 6. Academic Designing, Planning and Evaluation System

4. *Graduate Programs Evaluation System.* It is the system through which a graduate program is evaluated, and decides whether or not the evaluated graduate program can remain or be incorporated to the PNPC. This program's operation is responsibility of CONACyT through the Graduate Program's Direction. Currently the process of evaluation consists of a public call by CONACyT where only

institutions with graduate programs can apply. The Coordination of the Graduate Programs is responsible of filling out the application and gathering all the information required about the graduate program, its features, the researchers-teachers core, the technological, academic, financial, infrastructure resources, among others. In such evaluation, information from all the actors in the process must be collected, therefore students, researchers-teachers, administrative staff and graduates should participate in order to present important information to support the intention to remain or be incorporated to PNPC. Such incorporation generally gives benefits to the graduate programs of the University like scholarships, financial support, etc.

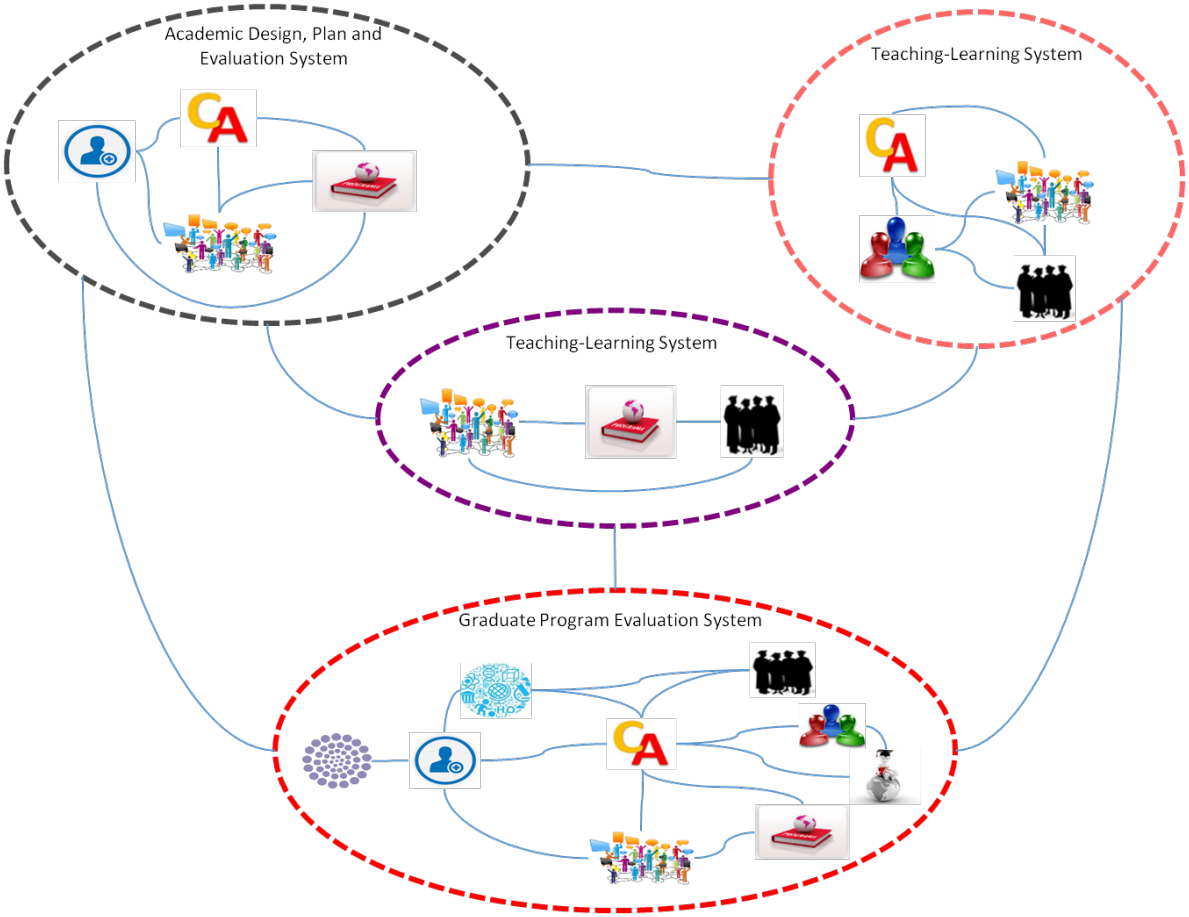


Fig. 7. Integration of the systems

The subsystems DPEA, SGA and SPEA transit through the subsystem SEP, in which by the evaluation a transformation is performed. From this process two outcomes can be obtained: a) Graduate programs that will remain or are accepted at the PNPC, and b) Graduate programs removed or not accepted at the PNPC. The type has 4 subtypes, namely:

a1.- Graduate programs recently created,
a2.- Developing graduate programs,
a3.- Consolidated graduate programs and

a4.- International level graduate programs.

CONCLUSIONS

The evaluation is an important activity in higher education, for the last two decades has become more important due to the relevance that accreditation has acquired for the institutions and the programs that international organisms make to set a standard.

This standard has been set in the "quality" level of the graduate programs. But, so far, a definition for quality in higher education has not been established. In order to have a methodology solid enough to give certainty and satisfy the academic, administrative, research and pertinence needs several authors have tried to design a way to measure this quality and since this term comes from the industrial environment, industrial methodologies were proposed to solve this matter.

The different approaches reviewed are lineal and mechanistic and they try to study the system from different perspectives partially, missing the whole. That is to say, a holistic view has not been applied yet.

The findings made to the date by this research are that no holistic evaluation has been made due to the lack of a systemic approach though which the elements participating in the whole system are identified and given a specific participation in the outputs of the system. Hence, no solid results were found in this matter.

Considering every element that participates or influences in the evaluating system helps to integrate a proposal that allows the improvement of the programs evaluated and the evaluating system itself; therefore, a new definition of what "quality" means in the academic environment and a systemic approach based on a soft systems methodology should be design in order to apply it in the different organisms in charge of evaluating graduate programs.

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