



Quality in Industrial Engineering School: Universidad Tecnica de Manabi



Esperanza Vivas Vivas ^a
Aleida Gonzalez Gonzalez ^b
Carlos Vinces Solorzano ^c

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Abstract

The paper presents a conceptual analysis related to quality in higher education, highlighting the peculiarities in Ecuador, presenting the content structure of the evaluation system of the quality required by the CEAACES and quality environment is addressed in the UTM, analysis related to the results of research on the quality of development in the career of Industrial Engineering of higher learning was obtained, proving that there are still weaknesses that can affect academic excellence, so it requires constant effort on the part of the institutions, which can be realized through research projects aimed at maintaining self-control of quality in universities.

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Author correspondence:

Esperanza Vivas Vivas,

Doctorate Program, Quality Program higher Education,

Universidad Tecnica de Manabi, Portoviejo Ecuador

Email address : esperanza.vivas9@gmail.com

1. Introduction

The university today faces the challenge of being inserted in a complex world with new demands of professionalism and skills associated with the emerging knowledge society. To this new educational tasks and requirements of accountable and efficient institutional management, they are added. It is about building a university that has good relations with the academic community, to incorporate added value to the experience of its students, who have the appropriate environments, to assume an appropriate curriculum, which implements relevant research, to conduct an appropriate assessment that is able to erase any vestige of favoritism than deserved the right deployment of meritocracy, which constantly fight for equality and development of a policy of inclusion without discrimination of any kind, to combat nepotism, corruption and generate permanent quality management in higher education [1].

^a Doctorate Program, Quality Program higher Education, Universidad Tecnica de Manabi, Portoviejo, Ecuador

^b Ph.D. Industrial engineer, Instituto Superior Politecnico Jose Antonio Echeverria, Cujae. La Habana Cuba

^c Doctorate Program, Research strategies in higher education, Universidad Tecnica de Manabi, Portoviejo, Ecuador

In line with the above, in recent years has increased the need to incorporate mechanisms and tools to improve the quality of institutional management and learning. They have been an intense discussion in relation to the concept of quality, scope, and parallel, have generated models of quality assessment and management.

The paradigm of sustainable development is no longer a slogan and has become a consistent and hopeful to the current crises alternative, that a reorientation of economic and technological models inspired by cultural profiles and axiológicos that overlap is promulgated approaches exclusively anthropocentric. The term sustainable development has been introduced in the terminology of all documents governing the modern world and has become popular.

Environmental education has been considered a means of approach to nature to facilitate preservation, a tool to educate the shift towards sustainable development models, incorporating a vision of the closest to the individual environment, to the extent that it is considered the medium is not as remote to be protected, but the place and the events in which individuals live and where they have to act to prevent deterioration [2].

It is currently not possible to achieve sustainability of the life of society, without the application of any environmental management organizational model, which is achieved with the use of certain tools to realize the same [3].

Ecuadorian universities are institutions dedicated to training future professionals, research, dissemination of knowledge, creation and development of culture and the generation of a critical consciousness; and as generating knowledge institution and as a driver of scientific, social and humanistic models, is facing a new challenge because of the key role it plays in the search for answers to one of the most important social challenges it faces the new century: human development environmentally and socially sustainable.

The goals of this work are to promote a process of reflection capable of delivering favorable synergies among college players, students and the corporate sector, aimed at achieving excellence of the trail Materials and methods process of Industrial Engineering at the UTM.

2. Materials and Methods

Research is the documentary and has a qualitative approach and analyze a reality without altering it. In addition, we can say that is because a type exploratory analysis on a subject little discussed, which will allow future can be more research that leads to new conclusions develops.

A group of techniques among those found was used: the survey to obtain results that allowed to confirm the veracity of the proposed objectives of the research; the literature which allowed give greater scientific relevance to the theoretical part of the research; analytical that was applied to conduct a thorough analysis of the results of the survey; statistics that served to show the results of work.

Also for the development of research literature review, it was used as data collection technique, achieving consult the various library materials such as books, manuals, theses, and journals.

3. Results and Discussions

3.1 Quality in higher education

It is often claimed that quality education is a relative concept, for various reasons, usually because who uses the term does in respect of the circumstances in which it invoked. Relativism has another perspective since the quality is similar to the truth, beauty, nature and constitutes an ideal difficult to understand; but for work, they try to study some concepts that allow an approach to the benefits that may result from their application and analysis.

International Standard ISO 9000/2005 Management Systems Fundamentals and vocabulary Quality defines the concept of quality in clause 3.1.1 as the degree to which a set of inherent characteristics fulfill requirements. It is noted that the term can be used with adjectives such as poor, good or excellent [4].

Related to higher education the National Council for Accreditation of Colombia considers quality as "a synthesis of features that can recognize an academic program or institution and make a judgment about the relative distance between the way is being paid service and optimum corresponding to its nature" [1].

Over the years people have developed methods and tools to establish and improve standards of performance of organizations. The continuous improvement process is an effective means to develop positive changes that will allow improving the results of the management of the institution and save financial resources, as quality failures cost

money and this, in turn, is paid by the client. Also, the continuous improvement process involves investment in new, more efficient technologies. Improving the quality of service that is provided to customers, increased levels of performance of human resources through continuous training, investment in research and development of new technologies, enables the organization to be better positioned to society to fulfill its social designation [5].

There are many institutions concerned with the quality of education as The United Nations Educational Scientific and Cultural Organization (UNESCO); The International Institute for Higher Education in Latin America and the Caribbean: (IESALC); The National Center for Evaluation of Higher Education (CENEVAL) in México; the National Commission for Assessment and Accreditation (CONEAU) in Argentina; The Nacional Center for Research on Evaluation, Standards and Student Testing (CRESST) in United States; The Quality Assurance Agency for Higher Education (QAA) in England; the Colombian Institute for the Promotion of Higher Education (ICFES); International Association for the Evaluation of Educational Achievement (IEA) or el International Assessment of Educational Progress (IAEP), which they raised the need to cover broader realities and comparative analysis of educational policies and systems in terms not only technical [6].

In Latin American government programs have generated policies and projects aimed at improving the quality of education, it is why the evaluation of educational systems has undergone considerable development both in countries with some experience in evaluating education systems, as in others with less experience have been incorporated progressively.

3.2 Quality in higher education in Ecuador

For the current Ecuadorian higher education system quality are a principle that consists in the constant and systematic pursuit of excellence, relevance, optimal production, knowledge transfer and development of thought through self-criticism, external criticism and continuous improvement [7].

The principle established by law is related to some approaches and visions of quality, mainly to the vision of quality and excellence, ie, which is achieved if standards are achieved [8]; and quality as the degree to which the institution, in accordance with its mission, has achieved its stated objectives [9].

In this sense it means the quality in universities and polytechnics as the degree to which, in accordance with its mission, part of the purpose and functions of the Ecuadorian system of higher education, achieve the objectives of teaching, research and links with the society, through the execution of processes that observe the principles of the system and seek continuous improvement. The quality at the institutional level includes aspects that distinguish the quality of courses, programs, and complement; this mainly because the institutional level is the framework that enables and facilitates the achievement of results at the level of courses and programs, the same as in turn contribute to the achievement of the objectives institutional[10].

The Ecuadorian education system consists of universities and polytechnics, they may be: public financed by the state; private co-funded by the State; self-funded individuals; and senior technical, technological, educational, arts and conservatories both public and private, properly assessed and accredited institutes under the law.

In Ecuador there are 72 universities and polytechnics: 35 are private accounting for 49%; 9 private cofinanced to 12%; 28 are public for 39%. That is, most universities are private. Between 1994 and 2008 the number of private universities grew by 91% compared to an increase of 28% public universities. As for public universities in the third level, 4 were created in the nineteenth century, 18 and 4 in the twentieth century in the XXI century. There are also 145 university extensions and support centers that function as universities, which are spread over 107 cities and about 290 teacher training colleges, technical and technological, intercultural and arts [11].

The institutions of the Ecuadorian National System of Higher Education are essentially pluralistic, are open to all currents and exposed forms of universal thinking scientifically. Direct their activity to the integral development of the human being to contribute to national development and the achievement of social justice, strengthening national identity in a multicultural context of the country, to the affirmation of democracy, peace, human rights, Latin American integration, and environmental protection. It is up to produce proposals and approaches to finding solutions to the country's problems; promoting dialogue between national cultures and those with universal culture, dissemination and strengthening its values in Ecuadorian society, professional, technical and scientific training and contribution to achieving a more just, equitable and inclusive society, collaboration with state agencies and society [12].

Institutions of higher education are communities of authorities, personal, academics, students, employees and workers. Legal entities are non-profit and are subject to the legally established constitutional mechanisms of control, the accountability to society about fulfilling its mission, goals, and objectives [12].

The academic quality of universities in Ecuador has been questioned by various public and private bodies because in a number of institutions are lacking research tools, infrastructure, qualified teachers and using appropriate methods of education. Ecuadorians have different criteria and perceptions regarding the quality of education at a higher level, considering that there are universities with over a hundred years of creation and new universities that still remain unknown to some.

Whereas previously it analyzed the Ecuadorian government has concentrated its efforts on maintaining an evaluation program aimed to regularly check the quality of management in institutions of higher education in the country.

The structure of the evaluation model is organized around six evaluation criteria that consider broader aspects of quality and are related to the basic functions of universities and polytechnics as well as processes, conditions, and resources that allow the execution adequate thereof. The design of the model and the order of the criteria presented, believe that is designed for the execution of an external evaluation process, which under current regulations constitutes verification process that the Board of Evaluation, Accreditation and Quality Assurance of the higher education (CEAACES) done through academic peers of all or institutional activities or a career or program to determine that their performance meets the characteristics and quality standards of higher education institutions and their activities are carried out in accordance with the mission, vision, and institutional purposes or career goals, so I can certify to society academic quality and institutional integrity [7]. In figure 1 the content structure of the evaluation system shown established by the CEAACES.

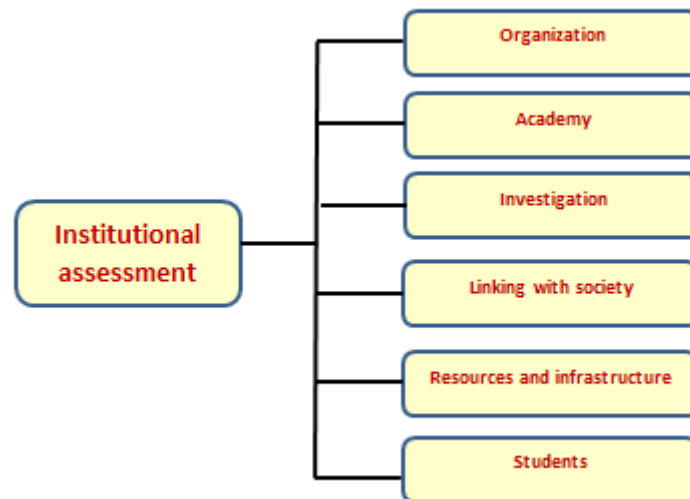


Figure 1. Structure of the content of the evaluation system

Sources: [10]

3.3 Quality environment in the Universidad Técnica de Manabí

In the UTM, It is a public institution located in the city of Portoviejo Manabi province, which was founded by Legislative Decree of 29 October 1952 and started operating since 25 June 1954. He currently teaches higher academic education, conducts research, and links with society.

Throughout history UTM professionals have contributed to the economic, social and technical development; recognized within the business and institutional environment for academic excellence and comprehensive training they receive at Alma Mater.

The upper house of studies has full authority to organize within the provisions of the Constitution of the Republic of Ecuador, the Organic Law on Higher Education, its regulations, other related laws, the Constitution of the UTM and regulations issued to structure organization of the institution.

Vivas, E. V., Gonzalez, A. G., & Solorzano, C. V. (2016). *Quality in industrial engineering school: Universidad Tecnica de Manabi*. *International Research Journal of Engineering, IT & Scientific Research*, 2(11), 92-101. <https://sloap.org/journals/index.php/irjeis/article/view/525>

Today the university is accredited in the System of Higher Education, ranking in category B, according to the resolution of CEAACES, issued on May 9, 2016 on the basis of the request for reclassification and respective evaluation process [13].

UTM's mission is to train scholars, scientists and practitioners, humanistic, ethical and solidarity, committed to the goals of national development, contributing to solving the country's problems as university teaching and research, able to generate and apply new knowledge, encouraging the promotion and dissemination of knowledge and cultures, under the Constitution of the Republic of Ecuador. The vision focuses on university become a leading benchmark of higher education in the country, promoting the creation, development, transmission and dissemination of science, technology, and culture, with social recognition, regional and global projection.

Both the mission and vision may ensure to the extent that the institution can articulate a model of systematic control of the quality of the teaching process, research, supported by management for continuous improvement of the integrated management of the university.

The UTM is not alien to the process of continuous improvement developed by the country in the stage of higher education and is committed to taking sides in the work and research that will lead to raising the quality of teaching and research processes, for which various projects including the study of some quality criteria is in the process of formation of Industrial Engineering develop.

During the work a profiled survey was conducted with a group of graduates, teachers, and managers of companies and institutions that are the main customers of the UTM, with the aim of making an assessment of the quality of teaching and research process in the Engineering Industrial, where you could see the following results:

Population and test

Surveys graduates, teachers and directors of companies and institutions that are the main customers of the UTM were made.

Calculations were performed according to equation (1) and given that $N = 345$, $P = 0.5$, $Q = 0.5$,

$$e = 0.1 \text{ and } Z = 1.96$$

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$$n = \frac{(Z)^2 (P) (Q) (N)}{(Z)^2 (P) (Q) + (N) * (e)^2} \quad (1)$$

Where:

n → Sample size

Z → Confidence level

P → Occurrence probability = 0.5

Q → Probability of nonoccurrence = 0.5

N → Population or universe

The value of the sample using equation results in 100, this allowed tabular data and quantify the 100 graduates, teachers and managers of companies and institutions that are the main customers of the UTM:

Question 1. ¿How do you assess the relationship between the professional profile of graduated as Industrial Engineer and reality of professional performance?

En la tabla 1 se muestran los resultados estadísticos sobre la pregunta formulada.

Table 1
Statistical results

Option	Frecuencia	(%)
Excellent	43	43
Good	43	43
Poor	14	14
Total	100	100

It was found that of the 100 respondents 14% believe that the relationship between the professional profiles of graduated as Industrial Engineer and reality of professional performance is poor; 43% believe it is good and; the remaining 43% think it is excellent.

Professional Profile is a method of gathering requirements and personal qualifications required for the successful fulfillment of the tasks of an employee within an institution. The relationship between this and the reality of their performance in the case of a graduate Industrial Engineer shows the quality achieved during the teaching process and research in the university.

The survey results allow defining that in professional quality results achieved by the educational institution but near even fail to achieve excellence. So the university should dump its main efforts in raising the level of education, outlining the teaching and research on strengthening experience activity, job functions, the training requirements, and knowledge as well as skills and characteristics personality required.

Question 2. ¿According to your criteria: How do you assess the academic quality and professional performance of teachers of Industrial Engineering?

In table 2 shows the statistical results on the question.

Table 2
Statistical results

Option	Frecuencia	(%)
Excellent	64	64
Good	36	36
Poor	0	0
Total	64	64

It was found that 64% of respondents felt that the academic quality and professional performance of teachers of Industrial Engineering is excellent; while 36% considered it good.

Academic quality and professional performance that teachers can undertake the role of teaching their students have a huge influence on quality management in higher education. The results of the survey show that still needs to achieve excellence in the professional performance of teachers of Industrial Engineering, which requires addressing efforts in raising the level of teachers in the performance of activities related with teaching and research.

Question 3. ¿To what extent do you think the curriculum of Industrial Engineering is relevant to the production needs of the province?

In this case, 50% of staff surveyed felt that there is an excellent correspondence relevance in terms of the curriculum of Industrial Engineering in relation to the production needs of the province; while the other 50% felt that the level of relevance is good.

The relevance of the curriculum of Industrial Engineering with the needs of production, closely related to the preparation of students depending on the production activities of the main customers of the university, because it depends on the satisfaction of businesses and institutions where the graduate will play staff productive functions.

The problem discussed above may have a significant impact on the criterion of the quality of the educational role of a higher education institution. It was found by the survey results still not a level of excellence is achieved regarding the satisfaction of the main customers of the university, which means that it should pay special attention to the improvement of the curriculum of the Engineering Industrial high house manabita studies.

Question 4. How do you consider the quality of graduates of the Industrial Engineering UTM?

As seen and figure 2, it was found that 29% of staff surveyed felt that quality is excellent graduates of the Industrial Engineering, UTM; while 64% thought it was good and; 7% stated that it was poor.

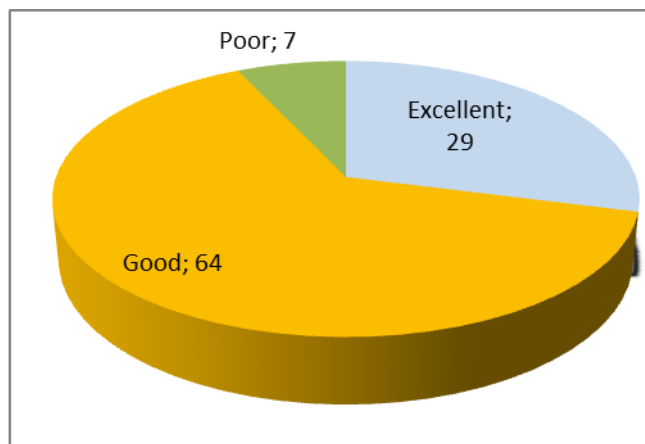


Figure 2. Quality recent graduate

The quality of university graduates has a close relationship with the category that has universities, provided through periodic evaluations performed by the higher education authorities in the country and in turn, may represent a greater or lesser weight in its future incorporation into the working life. This means that the college level holds it will be more viable the incorporation of graduates into professional life, as the results of university categorization is a higher or lower level of professional quality of graduates.

The Industrial Engineering UTM must continue to concentrate efforts to achieve the educational and research excellence, which is feasible adequate preparation during the process of categorizing the race developed by the CEAACES, thereby achieving raise the quality of graduates Industrial Engineering.

Question 5. ¿Determine your criteria the level of training that teachers of Industrial Engineering, as well as updating and relevance with technological changes and productive need for major customers of the university, is provided?

In figure 3 the level of training of teachers of Industrial Engineering, as well as updating and relevance with technological changes and productive need for major customers of the university is shown; 43% stated that it is good; while 21% thought that the level is poor.

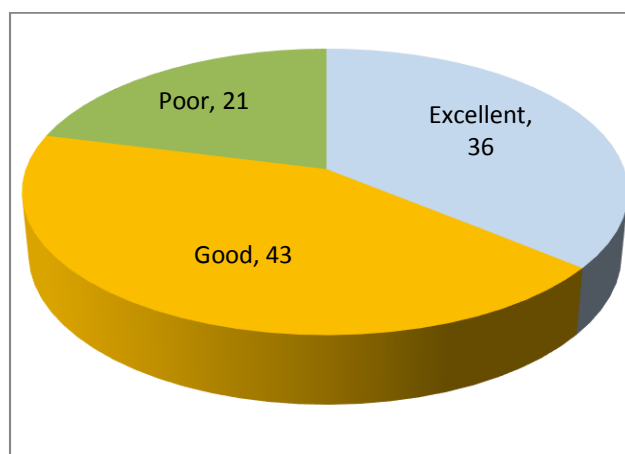


Figure 3. Level of training of teachers

The quality of the teaching and research management and its relevance to the production needs of the territory will maintain a strong dependence on the level of training that teachers and update correspondence are provided with the technological changes that are taking place in the development of society.

It can be stated that when a proper process of training and constant updating of teachers on technological changes and production processes is achieved, the educational institution will be better able to achieve excellence in

university management. That is why considering the results of the survey can say that in the case of Industrial Engineering has yet to work to achieve excellence in the training and preparation of teachers, so special attention should be paid to the development of plans constant training, where the elevation of the update on changes in technology and production processes deemed.

4. Conclusion

The research is focused on the race of Industrial Engineering UTM and the main weaknesses are related to: the professional profile of the graduate in Industrial Engineering and reality of professional performance; The academic quality and professional performance of teachers of Industrial Engineering; The relevance of the curriculum with the production needs of the province; The quality of graduates and career; The level of training that teachers of Industrial Engineering, as well as updating and relevance with technological changes and productive need for major customers of the university, is provided.

It can say what is relative and difficult to understand the concept of "quality" in education; but its meaning has been adequately defined by the Board of Evaluation, Accreditation and Quality Assurance for universities of Ecuador, according to achieve continuous improvement and excellence in teaching and research management, which has allowed in recent years have seen positive changes in higher education in the country.

The investigation identified that despite the effort made and the results achieved, there are still weaknesses that can affect academic excellence, so it requires constant effort on the part of the institutions, which can be realized through projects research aimed at maintaining self-control quality in universities, providing actions that enable continuous improvement and achievement of excellence.

Conflict of interest statement and funding sources

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Statement of authorship

The author(s) have a responsibility for the conception and design of the study. The author(s) have approved the final article.




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References

- Aramburuzabala, P., Cerrillo, R., & Tello, I. (2015). Aprendizaje-servicio: una propuesta metodológica para la introducción de la sostenibilidad curricular en la Universidad. *Profesorado. Revista de currículum y formación del profesorado*.
- Benayas, J., Alba, D., & Sánchez, S. (2002). La ambientalización de los campus universitarios: El caso de la Universidad Autónoma de Madrid. *Revista Ecosistemas*, 11(3).
- Bernhard, A. (2011). *Quality assurance in an international higher education area: a case-study approach and comparative analysis of six national higher education systems (Austria, Canada, Finland, Germany, United Kingdom, United States of America)*. na.
- Cheong Cheng, Y., & Ming Tam, W. (1997). Multi-models of quality in education. *Quality assurance in Education*, 5(1), 22-31.
- de Educación Superior, L. O. (2010). Consejo de Educacion Superior (CES).
- de Educación Superior, L. O. LOES.
- Ejecutiva, F. Consejo de evaluación acreditación y aseguramiento de la calidad de la educación superior.
- Gazzola, A. L., & Didriksson, A. (2018). Tendencias de la educación superior en América Latina y el Caribe.
- Herrera, J. J., Fedynska, S., Ghasem, P. R., Wieman, T., Clark, P. J., Gray, N., ... & Greenwood, B. N. (2016). Neurochemical and behavioural indices of exercise reward are independent of exercise controllability. *European Journal of Neuroscience*, 43(9), 1190-1202.
- Larrea, O. H. (2012). Sistema de Educacion Superior del Ecuador. *Obtenido de Ministerio de Educacion*.
- Manobanda, L., & Gabriela, M. (2015). *El Branding Corporativo y su influencia en la cartera de clientes en la Unidad Educativa Juan Benigno Vela de la ciudad de Ambato*(Bachelor's thesis, Universidad Técnica de Ambato. Facultad de Ciencias Administrativas. Carrera de Marketing y Gestión de Negocios.).
- Sayce, L. (2000). *From psychiatric patient to citizen: Overcoming discrimination and social exclusion*. St Martin's Press.
- Velásquez, F., & González, E. (2003). *¿ Qué ha pasado con la participación ciudadana en Colombia?* (pp. 10-11). Bogotá: Fundación Corona.
- Vera, M., Viviana, T., Fleitas Triana, M. S., Véliz Briones, V. F., & Vincés Solórzano, C. J. (2017). La vinculación de la sociedad con los patrones de calidad de universidades ecuatorianas e hispanoamericanas. *Dilemas Contemporáneos: Educación, Política y Valores*, 4(2).

Biography of Authors

	<p>Graduate in Industrial Engineering in the Universidad Técnica de Manabí (UTM), currently professor at the Faculty of Ciencias, Matemáticas, Físicas y Químicas of the same University. Coordinator of the research area. <i>Email: esperanza.vivas9@gmail.com</i></p>
	<p>PhD. Specialty of Quality Management, Industrial engineer, graduated from the School of Industrial Engineering, Master of Science in Quality Assurance, Executive Master in Strategic Quality Management, School of Industrial Organization in Madrid, Diploma in Strategic Quality Management, School Exceeding Basic Industry, Postdoc in Integrated Management, Federal University of Rio de Janeiro.</p>
	<p>Mgs. Educational management, full-time assistant professor, Engineer agricultural department coordinator Graduate in Industrial Engineering in the Universidad Técnica de Manabí (UTM), currently professor at the Faculty of Ciencias, Matemáticas, Físicas y Químicas of the same University.</p>