Volume 2, Issue 3 – July – December – 2018

Journal-Health, Education and Welfare

ISSN-On line: 2524-2075

RINOE®

RINOE Journal-Health, Education and Welfare, Volume 2, Issue 3, July - December 201, is a journal edited semestral by ECORFAN-Bolivia. Loa 1179, Cd. Sucre. Chuquisaca, Bolivia. WEB: www.ecorfan.org, revista@ecorfan.org. Editora en Jefe: RAMOS-ESCAMILLA, María. PhD, Co-Editor: IGLESIAS-SUAREZ, Fernando. BsC. ISSN-On line: 2524-2075. Responsible for the latest update of this number ECORFAN Computer Unit. ESCAMILLA-BOUCHÁN, Imelda. PhD, LUNA SOTO-Vladimir. PhD. Loa 1179, Cd. Sucre. Chuquisaca, Bolivia, last updated December 31, 2019.

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Presentation of the Content

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December 2018 Vol.2 No.3 1-8

Gender perspective in university students. A review of your perceptions and academic trajectories

Perspectiva de género en estudiantes universitarios. Una revisión de sus percepciones y trayectorias académicas

GUERRERO-AZPEITIA, Luis Arturo†*

Universidad Politécnica Metropolitana de Hidalgo

ID 1st Author: *Luis Arturo, Guerrero-Azpeitia* / **ORC ID**: 0000-0002-8905-7243, **Researcher ID Thomson**: P-3905-2018, **CVU CONACYT ID:** 653267

Received July 28, 2018; Accepted September 30, 2018

Abstract

This article aimed to characterize the perceptions of university students with regard to the gender perspective according to their academic trajectories. To achieve this goal, the object of study was constructed from a sociological perspective based on the theoretical proposal of Bourdieu in order to articulate the objective conditions and the corresponding production of subjectivity (opinions, beliefs and perceptions) of university students in two institutions of polytechnic education. Methodologically, the research was supported in a compared perspective that recovered quantitative techniques for the analysis of data such as multiple correspondence analysis and multiple stepping. The main results show the relationship between that the students show about the gender perspective and those conditions such as the academic trajectory and the socioeconomic context, consequently of the main conclusions the importance of the study of the gender perspective is highlighted by the recovery of the objective conditions of the social agents. These contributions provide both a description of the gender perspective and those elements to understand perceptions as a product of the objective conditions.

Gender perspective, subjectivity, academic trajectories

Resumen

Este artículo tuvo como objetivo caracterizar las percepciones de estudiantes universitarios respecto a la perspectiva de género en función de sus trayectorias académicas. Para lograr tal cometido, el objeto de estudio se construyó desde una perspectiva sociológica basada en la propuesta teórica de Bourdieu a fin de articular las condiciones objetivas y la correspondiente producción de subjetividad (opiniones, creencias y percepciones) de estudiantes universitarios en dos instituciones de educación politécnica. Metodológicamente, el trabajo de investigación se sustentó en una perspectiva comparada que recuperó técnicas cuantitativas para el análisis de los datos tales como el análisis de correspondencias múltiples y el escalonamiento múltiple. Los principales resultados dan cuenta de la relación que existe entre las percepciones que los estudiantes manifiestan respecto a la perspectiva de género y aquellas condiciones tales como la trayectoria académica y el contexto socioeconómico, en consecuencia, de las principales conclusiones se destaca la importancia que reviste para el estudio de la perspectiva de género la recuperación de las condiciones objetivas de los agentes sociales. Estas aportaciones proveen tanto una descripción de la perspectiva de género como aquellos elementos para comprender las percepciones como producto de las condiciones objetivas.

Perspectiva de género, subjetividad, trayectorias académicas

Citation: GUERRERO-AZPEITIA, Luis Arturo. Gender perspective in university students. A review of your perceptions and academic trajectories. Journal Health, Education and Welfare 2018, 2-3: 1-8

* Correspondence to Author (email: lguerrero@upmh.edu.mx)
† Researcher contributing first author

Introduction

The importance of the study of the gender perspective as a category of analysis in the social sciences allows us to identify the spaces of inequality, injustice and inequality between men and women and, although they have the same rights at birth and throughout their lives, are the characteristics derived from an androcentric culture that establishes roles and stereotypes that condition opportunities and differences for both sexes (Camarena, Saavedra and Ducloux (2015).

On the other hand, the approaches in the feminist theory in the educational field are based on the classical positions such as the liberal, the socialist and the radical, as well as the postmodern; in relation to the liberal it is conceived that the priorities are socialization, equality of opportunities and sex stereotypes and sexual discrimination processes. Regarding the socialist approach, its character is liberating and the dissertation associated with the role of women in economic and family terms and, with respect to the radical approach, advocates the repeal of patriarchal structures as well as the study of school regulations and the monopoly of knowledge (Gil, 2008).

In this context, the article presented here aimed to characterize the perceptions of university students in relation to the gender perspective according to their academic trajectories, specifically in terms of the baccalaureate of origin and the corresponding training area. The research questions were, what are the perceptions of university students regarding the gender perspective? What relation does the sociocultural context have with these perceptions? Are there differences in the perceptions of students from two different regions of the country, but from the same educational subsystem?

To achieve the stated objective and answer the research questions, the article was organized around different sections, the first of which corresponds to the theoretical-conceptual referents, where Bourdieu's theoretical commitment is mainly recovered, for whom the practical sense is the concretion of the objective sense and the lived sense; in a second section, the methodological resources of a relational nature are established, such is the case of the comparative method and the multivariate analysis.

Subsequently, the section associated with the analysis of results is presented, where the main differences and similarities between students of the selected analysis units are identified; a fifth section corresponds to the conclusions, where the importance of the sociocultural context and the baccalaureate of origin in the perceptions of the social agents are given; finally, some contributions and recommendations are issued.

It should be mentioned that, as the reader will be able to review, an articulation was sought between the theoretical perspective, the methodological bet of the comparative method and the techniques of multivariate analysis, since all of them are of a relational nature, which ensures a treatment and construction of the data from this perspective. In this sense, in addition to the above, the main contribution lies in the study of subjectivity mediated through the perceptions of university students from objective conditions.

This way of approaching the object of study allowed to rescue objective techniques as a means to study subjectivity in the social agents under study, which presupposes a not only relational approach, but also with a statistical rigor in its concretion even when the scope of the present study is interpretive cut.

Theoretical-conceptual references

For Bourdieu (1979) there is an articulation between the objective conditions and the corresponding production of subjectivity (opinions, beliefs, emotions and perceptions) of social agents. Consequently, the author suggests that in order to study the subjective or lived sense, it is necessary to know and recognize those objective conditions that are precursors.

However, we must avoid the temptation to consider an antagonistic perspective between objectivity and subjectivity, in this way not only the interdependence between them is focused, but a dialectical relationship is assumed, since the social exists in both structures external as in those considered as social structures, that is, history made institution and history made body respectively (Gutiérrez, 1997).

ISSN-2524-2075

Other authors such as Casañeda (2009) conceive in the recovery of the subject from a biological, cognitive, social and cultural basis; where it is also assumed as a product, but at the same time as a producer of a reproductive process in which it is necessary to recover the cited bases that favor the understanding of their own social practice.

The structure that Bourdieu proposes for the study of social practices results in the integration of the objective sense and the subjective sense as a practical sense, the first of them regulated by what he calls the field, which in turn causes the social agents to occupy a a certain position, while the second is constituted by capital in addition to the habitus and gives rise to dispositions (Bourdieu, 1979).

In this context, the field can be understood as a network of objective relationships between the positions that social agents occupy and are determined both by their present and potential conditions (Bourdieu and Wacquant, 2005). Regarding capital, it is considered as that work accumulated in a material state, internalized or incorporated (Bourdieu, 2001).

Regarding the habitus, Giménez (1997, p.6) considers that it recovers the cognitive, axiological and practical planes to have "a multidimensional character is both eidos (system of logical schemes or cognitive structures), ethos (moral dispositions), hexis (register of postures and gestures) and aisthesis (taste, aesthetic disposition) ".

This conception enables the study of subjectivity as a product of objective conditions, but in turn reconstitutes them through objectification processes, hence the importance of adopting a relational theoretical perspective that has an articulation with a methodological proposal that is also relational, since the real is the relational: what exists in the social world are relationships. No interactions between agents or intersubjective bonds between individuals, but objective relationships that exist "independently of individual conscience or will", as Marx stated (Bourdieu and Wacquant, 2005, p.150).

In this sense, the theoretical-conceptual referents were complemented by the selection of techniques in the same relational manner that were referenced in the following section.

Methodology

In order to achieve the objective, the present work was based on a comparative perspective that recovered quantitative techniques for the analysis of data such as multiple correspondence analysis.

Multiple staging for the treatment and analysis of perceptions, as elements subjective, of the social agents under study.

According to Guerrero (2017) the study of subjectivity can be approached from a perspective of comparative education, but taking into consideration the objective conditions as producers of subjectivity as perceptions, opinions, beliefs, values and emotions among other concepts. According to the author, comparative studies must move from an objectivist-realistic ontology to a subjectivist-relativist one. In this way:

The recognition of subjectivities requires a knowledge of the social with a dynamic, unstable, circumstantial character, where the language, experiences, the culture of each student, the educational policy, the management model of the educational institution, the relations of homology and of domination, values and emotions among other explanatory variables, play a very important role in understanding that reality (Guerrero, 2017, p.61).

In addition it is recognized that the compared method aims, among other aspects, to determine the differences or similarities between two or more units of analysis, being precisely the researcher who determines the priority of focusing any of them in terms of theoretical-methodological positioning.

Regarding a taxonomy of comparative studies, Collier (1994) establishes three types of comparative analysis and those are: a) referred to a systematic examination of statistical cut based on analysis of covariances, b) referrals susceptible of being analyzed from a theoretical perspective particular and c) those that focus a more interpretive perspective where the contexts of each unit of analysis take on special relevance.

ISSN-2524-2075

Being this last type of analysis the one adopted in this research and that in addition to the Bourdieusian theoretical position allowed the concretion of a relational model between the interpretive categories, the social context and the selected methodological techniques.

In a first methodological moment, it was decided to take as units of analysis the Universidad Politécnica Metropolitana de Hidalgo (UPMH) and the Polytechnic University Bicentennial (UPB), the first of them located in the municipality of Tolcayuca Hidalgo and the second one based in the City of Silao Guanajuato, formally initiating operations in 2008 and 2010 respectively. Subsequently, the similarities and differences of the units of analysis were identified, which are representatively presented below.

Within the similarities that both educational spaces have, in addition to the regulations that are common to them when belonging to the same educational subsystem, they were based on the fact that both institutions provide the Educational Program (EP) of Engineering in Logistics and Transport (LTE) whose curricular design started in the last months of 2008 by the academic plant of the UPMH under the methodological supervision of the Coordination of Polytechnic Universities (CPU), later in the month of July 2009, academic staff is incorporated into the curricular design works of which in the end it would be the UPB; being in consequence the two pioneering institutions not only in the SUP but at the national level that gave this EP. In 2017 the Accreditation Council of Engineering Education (CACEI) accredited the LTE EP in May 2017 and December 2017 respectively in each educational space.

The differences were mainly in the economic, agricultural and industrial development of its corresponding socioeconomic environment, Silao is home to important techno-industrial zones such as the Expo Guanajuato Bicentenario, the Guanajuato International Airport and the Guanajuato Interior Port, the latter It is a logistics and business complex composed of four industrial clusters, educational services, logistics services, commercial services, community services, support and support services, innovation city, aerospace park as well as the presence of international organizations. In this space converge national and international companies.

As well as an important automotive industry and logistics services.

Regarding Tolcayuca, it is a mainly rural municipality dedicated mainly to agriculture and livestock, it does not have industrial parks installed in its territory, although it borders the municipality of Tizayuca where an industrial park is located, as well as with the municipality of Villa de Tezontepec where the Logistics Platform of Hidalgo (PLATAH) is built, although it is planned to be an important logistics node, it is still in its initial construction phases.

By previous it was determined to compare the perceptions of university students assigned to the educational program of Engineering in Logistics and Transport, since in both institutions that career is taught; subsequently, the interpretive categories were determined, as well as indicators of the academic trajectories with the intention of establishing the relationship between the perceptions of the students and their socioeconomic characteristics.

In a second moment, a survey consisting of two sections was structured and applied, the first of them with questions referring to the sociocultural context and the second based on closed questions under a Likert scale modality alluding to the perceptions of university students regarding performance of women and men in different spaces (4 items), to the gender preference in terms of work (4 items) and roles to be played (3 items). The data was processed in SPSS and a Cronbach alpha reliability coefficient of 0.839 was obtained for students (159), UPB and 0.841 for students (242) of UPMH.

Finally, in the third moment, the responses were processed from the multidimensional analysis and according to Hair, Anderson, Tathan and Black (1999) an object has objective and subjective dimensions so the technique called multiple correspondence analysis, in Both techniques of interdependence between variables or categories, facilitates their interpretation through the perceptual maps generated from the interrelation of said variables.

The methodological commitment adopted facilitated both the theoretical-procedural articulation and the interpretation of the data from a relational perspective and not from the review from each of the interpretive categories. The main findings are presented below.

Results

Regarding the gender of the students, the number of women surveyed in the UPB was slightly higher than that of the men (53.5% and 46.5% respectively), while in the UPMH there was a reverse phenomenon, the female students surveyed were lower than their male counterparts (48.8% and 51.2% respectively).

What represents a total of 52.3% of women surveyed by 47.7% of men. Below are the results derived from the treatment of student perceptions.

Better performance of activities entrusted according to gender

Regarding the perceptions about a better performance of women in the activities entrusted in the areas of politics, education, business sector and government sector, the students were prone to value in block according to the scale of assessment (totally in agreement, of agreement, disagree and totally disagree) in both educational institutions.

In the case of the UPB and in general, students of both genders tended to consider their perceptions more focused on the fact that both genders develop their activities efficiently without any distinction in terms of gender. However, it is the students from an open or online baccalaureate (with a general baccalaureate) who showed greater proclivity to consider that men tend to be more efficient in terms of the development of their activities in the various areas investigated.

On the other hand, students from sub-systems of higher technological education such as CONALEP, CECyT, CBTiS, CBTA and CTMAR (with areas of physical-mathematical and social-humanistic knowledge) were more inclined to value a better performance of women.

As a complement to the UPMH, the students of both genders were more inclined to agree that women perform their activities better in the different areas investigated with respect to men, particularly those graduated from CETiS, CECyT, CONALEP and Colegio de Bachelors (in social-humanistic, physical-mathematical, economic-administrative and general baccalaureate areas of knowledge).

On the other hand, there was a greater tendency to consider that men perform better their activities entrusted to high school / vocational and preparatory students in line / open and, with an area of training in chemical-biological.

In accordance with the above, a similarity could be identified in terms of the perception that women perform their functions better in the political, governmental, business and educational sectors than men, especially for students with technological sub-systems; otherwise it happened with those students who come from general baccalaureates for whom men are more efficient in the performance of their duties.

Gender preference in labor terms in the LTE

In relation to the preference in labor fields of both the public and private sectors, support for productive projects and in society in general, students of both genders tended to value en bloc (as in the previous section) in the same scale (totally agree, agree, disagree and totally disagree) in both educational institutions.

For students of the UPB, there was almost always a preference for the male gender in terms of work, being the graduates of private schools, CONALEP, CBTIS, CBTA, CTMAR and CETiS the most inclined, specifically those whose area of training was in economic-administrative, chemical-biological and physical-mathematical; whereas those graduates of a general baccalaureate proper to the subsystem of high school and with emphasis in the social-humanistic area who expressed a neutral perception regarding gender preference.

Regarding the UPMH, the students presented a greater dispersion in their perceptions, although they are those graduates of the different types of preparatory (general, particular, open or online) and Colegio de Bachilleres and CETiS.

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Mainly in the social-humanistic areas and economic-administrative who considered that men are almost always given greater preference in the workplace; this situation contrasts for the students graduated from CETiS and in the chemical-biological area who manifested an intermediate perception, that is to say, they consider that there are no preferences in terms of gender. In this sense, it is observed that there was no correspondence between the perceptions of the students of both genders of the two educational institutions, since in the case of the UPB it was the graduates of the most technological baccalaureates who thought that men have higher preference, in counterpart in the UPMH were the graduates of general baccalaureate who shared that perception.

Gender and society

In this section we present the results of the students' perceptions of gender and society thematic relationships, for which an analysis was carried out for each one of the themes.

Regarding the question of whether families should only be formed by heterosexual couples, students of the UPB expressed their total agreement are those who graduated from CONALEP with economic-administrative training area or those with general baccalaureate; those who expressed total disagreement were those graduates of CBTiS, CBTA, CTMAR and Colegio de Bachilleres without focusing on a particular training area; the rest of the graduates manifested an antagonistic position, since they expressed their agreement and others disagreed. In these cases they include graduates of CECyT, CETiS and Preparatory high priority with physical-mathematical, chemical-biological and social-humanistic training.

In counterpart, students of the UPMH expressed their total agreement those graduates with social-humanistic training area, in addition those graduates with chemical-biological training area were more likely to be in total disagreement with such a premise, that is, they agreed to that non-heterosexual couples can form a family.

Among these positions (totally agree and totally disagree) were those students graduates of a general baccalaureate proper to the preparatory schools and College of Bachelors.

Finally, among the antagonistic positions (agree and disagree), the students who graduated from CECyT, CBTiS, CBTA and CTMAR were taken specifically in economic-administrative and physical-mathematical areas.

From the above it was observed that there is a greater dispersion in the opinions of the UPMH students regarding a greater polarization in the perceptions of their counterpart in the UPB.

On the other hand, similar perceptions were not identified in those students of the same subsystem, which suggests that the sociocultural and economic context in each region affects their perceptions.

Regarding the question whether women should prioritize the formation of a family before their professional development, students who come from CECyT or open or online high school of the UPB were more inclined to express their disagreement, while those who graduated of Colegio de Bachilleres, a general high school with social-humanistic, chemical-biological and physical-mathematical knowledge areas tended to have a position between disagreeing and totally disagreeing, which presumably would imply that women should not put their profession before the formation of a family; the opposite situation occurred with the graduates of CONALEP and CETiS with training areas associated with economic-administrative and general baccalaureate, who were inclined to express their agreement that women should put the formation of a family.

In this aspect, in the perceptions of UPMH students it was observed that, regarding the prioritization of women with respect to their professional development, there was a general dispersion among students among the assessment scales, however, some representative proclivities were presented. The students expressed their proclivity to be totally in agreement in the premise under study when they are graduated from the social-humanistic area although there was no predisposition regarding the type of baccalaureate.

Situation that did happen with those who manifested their total disagreement and whose baccalaureate of origin is the open or online high school and those with an area of chemical-biological knowledge.

ISSN-2524-2075

UPMH students presented an antagonistic position between agreeing or disagreeing especially in those students graduated from physical-mathematical areas and whose subsystem of origin is the CECyT, CBTiS, CBTA and CTMAR.

A situation similar to the previous one was also observed in this section in the sense that there is a greater dispersion in the perceptions of UPMH students and a non-correspondence in the perceptions of students of the same subsystem in different regions.

Finally, regarding the perceptions of the students regarding the importance of the feminist movement, in the UPB, the answers indicate that students coming from high schools such as CECyT, private high school, open or online and / or with training areas in chemical-biological and social-humanistic they tended to disagree with this movement; while they agreed that students from CETiS and high school / vocational and in the physical-mathematical areas were more inclined to this according to the feminist movement; finally, students from CONALEP and in the Economic-administrative areas and the general baccalaureate were the ones who showed the greatest tendency to be totally in agreement with the feminist movement.

Regarding the responses of UPMH students, there was a tendency to be in total disagreement with the feminist movement in those students coming from open or online high school; while those that come from CETiS and private and public / vocational high schools or with a formative area of economic-administrative sciences were in agreement with this movement; finally, students from CECyT and in physical-mathematical areas were the ones who expressed their disagreement.

These results show the relationship that exists between the perceptions that the students expressed regarding the gender perspective and some factors investigated such as the socioeconomic context and the academic trajectory, specifically the type of high school of origin and the corresponding training area.

Conclusions

The study of the gender perspective in university students highlights the importance of recovering objective conditions as producers of subjectivity in social agents. Under this premise, this article presented empirical evidence that suggests the need, before the study of perceptions in university students, to take into consideration those objective conditions that provide a point of reference tending to objectify said perceptions.

In this sense, the articulation between the theoretical commitment, the comparative method and the multivariate analysis techniques used were an articulating axis that allowed to identify a dynamism in the perceptions of the agents with respect to gender equity, that is, they did not identify a pattern associated between the baccalaureate of origin and the corresponding area of knowledge that was kept constant in both units of analysis; which was precisely one of the initial research assumptions.

However, some invariants were observed and they were precisely a greater dispersion in the perceptions of those students assigned to the UPMH with respect to various topics of gender and society, while in the UPB a greater tendency to polarization of the students was observed perceptions. This process suggests the influence of the sociocultural context of the students.

Where in the case of the UPMH the proximity to Mexico City can be an explanatory variable, since there is a greater openness for the recognition of various topics associated with the perspective of gender (gender equity), recognition of equal marriage and sexual preferences and legalization of abortion, for example; situation that contrasts with a more conservative position in the Mexican lowlands where the UPB is located and, which in both cases affects the social construction of reality by social agents.

ISSN-2524-2075

Contributions and recommendations

The contributions derived from the research that gave rise to this article provide elements to approach the study of subjectivity from the objective conditions that produce it; from this perspective, the study of subjectivity by itself and for itself lacks theoretical-methodological elements that allow its objectification. In this way, opinions, perceptions, values and emotions are important, but they have a greater significance if they are studied under the objective conditions that produce them.

In this sense, the recommendation is to deepen the study of the objective conditions of the social agents in question in order to explain and understand the subjectivity of these agents, that is, it matters the study of subjectivity, but also and dialectically the study of the objective conditions that produce it. This positioning involves taking into account a greater number of explanatory variables to achieve an understanding of the interpretive categories of interest.

Acknowledgement

I would like to thank the authorities of the Universidades Politécnicas Metropolitana de Hidalgo y Bicentenariofor the development of the present investigation, but above all.

The students of both educational institutions who so kindly agreed to share their perceptions, opinions and beliefs in relation to the gender perspective.

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Article **Journal-Health, Education and Welfare**
December 2018 Vol.2 No.3 9-17

Group tutoring as a comprehensive training strategy

La tutoría grupal como una estrategia de formación integral

JÁUREGUI-OJEDA, Ma. Guadalupe†*, DELGADO-CELIS, Ma. Dolores, CRUZ-RENTERÍA, María Merced and FÉLIX-JÁCQUEZ, Rosa Hilda

Tecnológico Nacional de México / Instituto Tecnológico San Luis Potosí

ID 1st Author: *Ma. Guadalupe, Jáuregui-Ojeda* / **ORC ID:** 0000-0001-5462-0197, **Researcher ID Thomson:** P-4443-2018, **arXiv Author ID:** gpejauregui ID

ID 1st Coauthor: *Ma. Dolores, Delgado-Celis* / **ORC ID:** 0000-0003-0141-497X, **Researcher ID Thomson:** M-1649-2018, **arXiv Author ID:** ma.dolores ID

ID 2nd Coauthor: *Maria Merced, Cruz-Rentería* / **ORC ID:** 0000-0001-7498-0484, **Researcher ID Thomson:** N-4046-2018, **arXiv Author ID:** MECHE ID

ID 3rd Coauthor: *Rosa Hilda, Félix-Jácquez* / **ORC ID:** 0000-0001-6961-341X, **Researcher ID Thomson:** E-9292-2018, **arXiv Author ID:** rhfelix ID

Received July 28, 2018; Accepted September 30, 2018

Abstract

Group tutoring applied to a group of engineering students for four periods, with an advance of three of them. The objective was to contribute to the integral formation, including the academic aspects to acquire professional and transversal competences. The approach used was qualitative with the method Research-Action, which allows knowing at the same at that the problems posed by the participants are answered. In this case, the first step was to diagnose the problem with the results of the previous period; with this information, the action plan was built in five face-to-face sessions with the tutored students; then the review and reflection on the actions taken were carried out; the results were evaluated and the actions of the next period were replanned. The results of the integral development were the following: all the tutored students participated at least in the extracurricular activities; English learning was promoted through financial support. The skills worked were communication, tolerance and adaptation. The general culture was encouraged. The academic part was also attended promoting corrective actions to decrease the failure of the integral calculus, whose initial percentage was 29.5, remaining at the end in 5. The conclusion indicates that the mathematical failure should continue to work.

Group tutoring, integral development, transversal skills

Resumen

Tutoría grupal aplicada a un grupo de estudiantes de ingeniería en un lapso de cuatro semestres, con avance de tres. El objetivo fue contribuir a la formación integral, incluyendo aspectos académicos para incrementar competencias profesionales y transversales. El enfoque utilizado fue cualitativo con el método Investigación Acción, que permite conocer al mismo tiempo que da respuestas concretas a los problemas que plantean los participantes. En este caso, lo primero fue diagnosticar el problema utilizando los resultados del periodo anterior; con esta información se construyó el plan de acción en cinco sesiones presenciales con los tutorados; luego se ejecutó y se hizo la revisión y reflexión sobre las acciones hechas; se evaluaron los resultados y se replanificaron las acciones del siguiente periodo. Los resultados de formación integral fueron: todos los tutorados participaron en al menos dos actividades extracurriculares; se impulsó el aprendizaje del inglés por medio de apoyo económico. Las competencias trabajadas fueron comunicación, tolerancia y adaptación. Se fomentó la cultura general. También se cuidó la parte académica promoviendo acciones remediales para reducir la reprobación de cálculo integral, cuyo porcentaje inicial fue de 29.5, quedando al final en 5. Las conclusiones indican que se debe seguir trabajando la reprobación de matemáticas.

Tutoría grupal, formación integral, competencias transversales

Citation: JÁUREGUI-OJEDA, Ma. Guadalupe, DELGADO-CELIS, Ma. Dolores, CRUZ-RENTERÍA, María Merced and FÉLIX-JÁCQUEZ, Rosa Hilda. Group tutoring as a comprehensive training strategy. Journal Health, Education and Welfare 2018, 2-3: 9-17

* Correspondence to Author (email: gpejauregui@itslp.edu.mx)
† Researcher contributing first author

Introduction

The tutoring in the National System of Technological Institutes (currently National Technological of Mexico) is "a process of group or individual accompaniment that a tutor provides to the student during their stay in the Institute, with the purpose of contributing to their integral formation and to influence in the institutional goals related to educational quality; increase the terminal efficiency indexes, reduce the failure and dropout rates ". The axes that support it are: academic development, personal development and professional development.

In 2004, the National System of Technological Institutes implemented the Educational Model for the XXI Century (General Directorate of Higher Technological Education, 2012b), which expresses the need to comprehensively train students. In 2006, the work of the National Tutoring Plan began, as well as its implementation in the campuses. The first works that were done in the Instituto Tecnológico de San Luis Potosí (ITSLP) did not have a clear methodology or a purpose that would sufficiently justify the time that the teachers should devote to the program.

At the national level, the General Directorate of Higher Technological Education continued to work on the mentoring program and in 2012 it presented the Institutional Tutoring Program (PIT), which supports and systematizes the granting of tutorial attention to students of all the technological institutes of the country, through the Manual of the Tutor, with the aim of improving the quality of education and contributing to its integral development, as well as having a positive impact on the permanence, graduation and appropriate degree levels (General Directorate of Higher Technological Education, 2012a).

To ensure its implementation, the guidelines that regulate its operation in 2012 are issued and updated in 2015 for the 2009-2010 study plans. (National Technological Institute of Mexico, 2015).

The Tutor's Manual and the operating guidelines made a difference in the way the tutoring program works: the manual is a guide for the tutor, which establishes a methodology and proposes a series of activities for the tutored students.

For its part, the guideline provides a structure for management and points out in a timely manner those responsible for its operation.

In the ITSLP, tutoring was only worked with the individual modality. In 2012, with the implementation of the PIT and its guidelines, compulsory tutoring is established for the first four semesters of the race, with the first semester as a group and the following ones individually, with the result that students have more than one tutor.

The proposal of this project applies the tutorial action in the group modality the first four semesters of the race -in the place of the sea only the first- and a group of tutors, because it is attended in a global way the academic dimensions, intellectual, affective, personal and social of the student (Rodríguez, 2001, cited in Arbizu, Lobato and Del Castillo, 2005). Failure is an important aspect of the project; a study conducted at the Technological Institute of Sonora (ITSON). The highest rates of failure are related to mathematics (De la Cruz, 2008, cited in Guzmán, 2013) and causes the family Aspects related to the normativity and infrastructure of the educational and inclusive process, individual characteristics of the students, as lack of dedication to study, disinterest, absenteeism or laziness.

The objective of the project is to contribute to the integral formation of the students, including a good academic performance that is reflected in the progress of their school trajectory and their permanence in the school.

The justification for working with the group tutoring modality is that by keeping the tutor to the same students the four semesters that the institution establishes as mandatory, a better accompaniment can be given, by forming a more permanent tutor-tutored relationship that allows a better knowledge of the guardian of the needs of his tutors and a more relevant intervention, precisely in the most critical semesters that generate the greatest expulsion of students for failure and desertion, basically. The tutor, in addition to working on the retention and causes of failure, acquires the commitment to promote actions tending to provide greater academic and educational value to young people.

ISSN-2524-2075

Being able to influence all areas of the individual's development (Casillas, The integral development of the student, contribution for a university profile, 2011).

The initial study group was 62 tutors. The progress of the project is three semesters. In the first semester, the work plan focused its efforts on students knowing the regulations that applied them and school dynamics so that they could adapt to the higher education system and ensure its permanence. Tinto (1986, cited in Guzmán, 2013) points out that dropping out is more related to a lack of personal integration and adaptation to the university community, hence the importance of student identification with their university, so that they can maintain a personal interest that helps you finish your studies.

They were also given surveys to diagnose their study habits, their learning styles and their level of self-esteem; in all cases they were given guidance based on the results. In academics, his grades were followed up.

At the end of the semester the tutors of the study group approved all their subjects; the retention actions were positive, since no casualties were recorded and all scheduled activities were carried out.

In the second semester, we worked on the detection of the needs of the tutors in order to generate minimum conditions for their integral development: they were given a general and oral health examination; the ITSLP language center diagnosed the English proficiency of the tutors; the cultural activity was the visit of the whole group to the interactive museum El Laberinto. In the academic part, the disapproval of advanced mathematics, especially integral calculus, was the focus of attention due to its high incidence. Regarding retention, a drop was registered because a tutor decided to change careers and university, so the group was reduced to 61.

The information presented in this paper corresponds to the third semester, whose specific objective was to work on integral training in order to increase professional and transversal competences, without neglecting the academic aspect.

Study group

The research group is made up of four teachers-tutors and 61 students-tutors of the careers of Engineering in Business Management and Industrial Engineering.

Methodology

A qualitative approach was used through the Action Research method, which allows the expansion of knowledge in the socio-educational context, while giving concrete answers to the problems that the participants pose at each stage.

The information generated in each cycle is analyzed to evaluate the effectiveness of the actions undertaken and the personal changes of the participants, and in turn, serves to make decisions and make possible adjustments in the subsequent research cycles that allow to modify and improve some situation. This methodology contemplates the following steps for each research cycle (Pérez-Serrano, 1998, cited in Colmenares & Piñero, 2008).

1. Diagnose the problem.
2. Build the action plan.
3. Implementation of the plan and observation of its operation.
4. Reflection, interpretation and integration of results.
5. Replanning.

In each research period, these five steps are carried out through a work plan called the Action Plan Tutorial (APT). The Institutional Tutoring Program must reflect the central role of the students and contribute significantly to the improvement of their training process, so that it is effective requires an institutional effort of organization and planning that includes among its most important parts an objective diagnosis of the student care needs (Romo & Romero, 2015).

Development

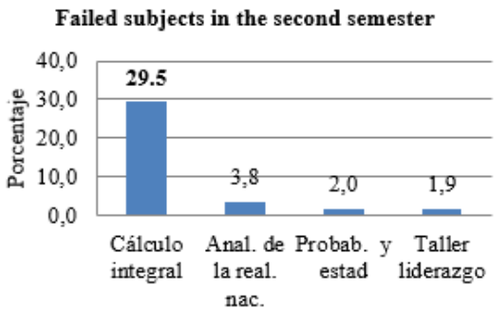
In each period, the information generated from the results of the activities and their analysis, serves to build the APT for the next semester, also considering the guidance provided by the Manual of the Tutor of the SNEST (General Directorate of Higher Technological Education, 2012a).

In the third semester five face-to-face sessions were planned for the tutors, see APT in Annex 1.

The implementation of the process of the third period began with the analysis of the results of the second semester, finding that the highest failure rate was in integral calculation with 18 tutorates that represented 29.5%, which confirms what was found by De la Cruz (2008, cited in Guzmán, 2013) that mathematics has the highest rates of reprobation.

From this result, a first remedial action was undertaken, which consisted in encouraging them to recur during the summer to avoid the delay in their reticular advance.

In the first face-to-face session with the tutors, the APT and the results of the previous semester were announced. See Graphic 1.



Graphic 1 Failed subjects in the second semester
Source: Self Made

As already mentioned, the first remedial action was that the students resorted to integral calculus during the summer, in which five enrolled and all passed. Of the 13 that did not attend, one was discharged and the rest were given a survey to know the reasons that they considered were the real cause of their disapproval, with the purpose of designing a remedial action. See survey in Tables 1 and 2.

Op	Concept
A	I do not understand, because I lack bases (prior knowledge)
B	I did not do the activities (exercises, problem solving, practices, others)
C	I do not have study habits and I do not dedicate enough time
D	I am easily distracted, I am not interested in the subject, I am not interested in the career
E	I do not have time to study because I work (I'm married, I have children, etc.)
F	I miss class or I'm late

Table 1 Causes related to the performance of the tutorate in integral calculus

Op	Concept
A	Does not know how to explain, does not solve doubts
B	I ask for help to clarify doubts and is not willing
C	Missing class or being late
D	He did not give me feedback in time to know how I was going
E	Did not qualify according to what was established at the beginning of the course
F	It took away opportunity to present complementary exam

Table 2 Causes related to the teacher who taught the subject of integral calculus
Source: Self Made

This session also addressed the diagnosis of English proficiency that had been made to the tutors in the previous semester by the language center of the ITSLP, whose result was that 69% had the basic level A1. The action carried out as part of its integral development was the management of a 50% discount scholarship to take English courses. 48 tutors said they were interested.

In the second session, feedback was given regarding the survey applied to the students who failed in integral calculus, the answers were ordered from highest to lowest; those attributed to the responsibility of the student.

Indicated that they fail because they miss class or arrive late (5); they do not do tasks or exercises (4); they do not have study habits (4); they do not understand because they lack prior knowledge (3); they work and do not have time to study (2). These findings confirm the results reached by Guzmán (2013) that the main cause of students' failure is the lack of dedication to study.

Regarding the causes attributable to the teacher of the subject, ordered from highest to lowest frequency were: the teacher did not feedback in time to know how they were (3); the teacher has no disposition to clarify doubts (2) and finally, he does not know how to explain (1).

Mentoring must operate in the framework of a formal articulation with programs and services to improve the educational process (Romo & Romero, 2015) that formally has the ITSLP, so that once analyzed the information product of the survey, the second remedial action It consisted of channeling them to the advisory program in the area of basic sciences and they were given personalized follow-up. They were also stressed to continue to improve their study habits and be proactive.

The action oriented to the integral formation was the conference given by the dentist of the institution on oral health, derived from a revision to the tutors in the previous semester, where it was found that 74% had gingivitis and 65% presented cavities.

In the third session, the proposed activities were totally directed to the integral development of the tutors. To promote the culture and the integration of the group in a recreational environment, a visit was made to the Magical Town of Real de Catorce, with the attendance of 12 students and the tutors. In addition.

They were invited to the conference cycle of the week of integral health in the facilities of the ITSLP, where 33 tutors participated.

In the fourth session several activities were proposed in which 50 tutorates participated: the partial grades were monitored and, to work on the professional and transversal competences, the students were motivated to participate in the Green Manufacturing Industrial Engineering Forum, academic event that was made up of workshops, industrial visits, conferences and panel of graduates, with the intention that they knew more about the field of work of their careers and self-motivated.

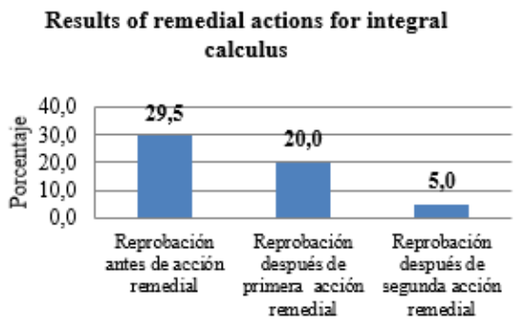
In this session a workshop was also given to develop the individual life and career plan, based on the identification of strengths and weaknesses. Lobato and Ilvento (2013, cited in De la Cruz, 2017) refer that the field of orientation and mentoring has been reformulated, in order to help in the construction of student life projects that promote their integral development and accompaniment in their processes of reflection and problem solving, both on a personal and professional and labor level.

In the fifth session the tutors were offered feedback on academic performance; they were made to see the importance of health care and to continue working on it. The results of the life and career plan were commented. The closing of the activities of the semester culminated with the evaluations that do the tutors to the performance of the tutors and to the APT.

Results

In relation to the academic part, the remedial actions focused on integral calculus, the subject with the greatest failing.

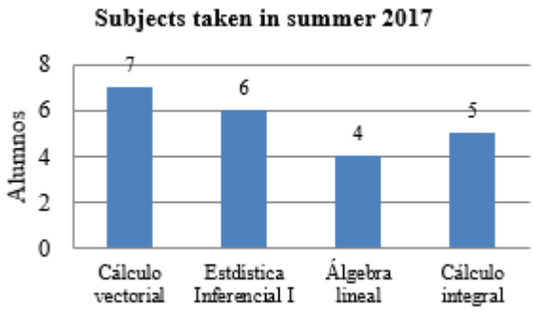
Were effective, achieving that of the 18 students (29.5%), in the first remedial action 5 they approved in summer, decreasing to 20 %; After the second remedial action, they approved 9 more, with 5% remaining as the final percentage of disapproval. See Graphic 2.



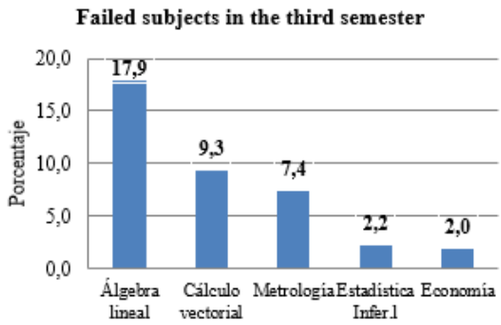
Graphic 2 Results of remedial actions for integral calculus
Source: Self Made

Of the four students who failed, there was a desertion and three went to special course.

It is worth mentioning that some students took advantage of the summer course to pass subjects such as vector calculus (7), inferential statistics I (6) and linear algebra (4), in addition to those that recursed calculus (5) with a total approval, see Graphic 3.

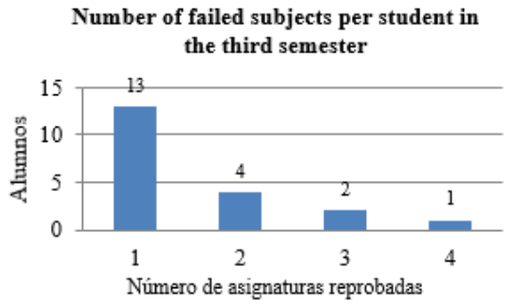


Graphic 3 Subjects taken in summer 2017
Source: Self Made



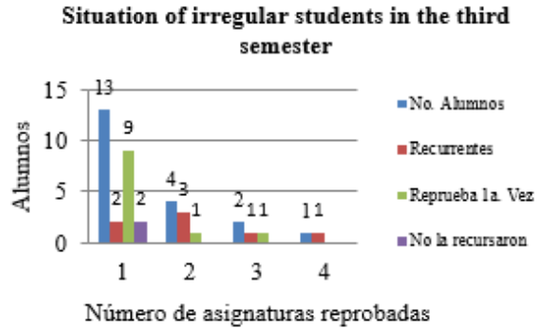
Graphic 4 Failed subjects in the third semester
Source: Self Made

An analysis was made of this subgroup of 20 irregulars, finding that 13 of them failed a single subject, four subjects, two with three subjects and one with four subjects, see Graphic 5.



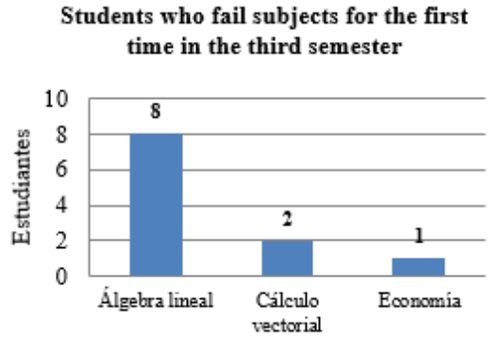
Graphic 5 Number of failed subjects per student in the third semester
Source: Self Made

Of the 13 tutorates that failed a subject, two are recurrent, nine are for the first time and two did not recurs; of the four tutors who failed two subjects, three are recurrent and one for the first time; There is only one recurrent tutor who failed four subjects, see Graphic 6.



Graphic 6 Situation of irregular students in the third semester
Source: Self Made

A review of the academic records of those who failed for the first time was made, finding that eleven of these students had been regular the first two periods and in the third they failed: linear algebra (8); vector calculation (2) and economy (1). Again it is confirmed that mathematics is the highest index of failure (De la Cruz, 2008, cited in Guzmán, 2013). See Graphic 7.



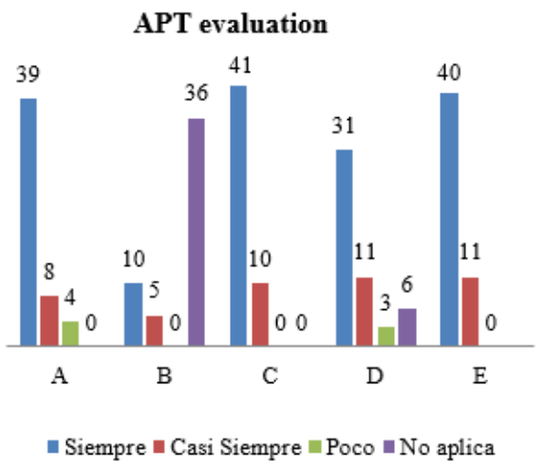
Graphic 7 Students who failed for the first time subjects in the third semester
Source: Self Made

In relation to the training part, one of the actions was aimed at having students master a second language; 48 tutors were interested in the financial support managed and 15 took the winter course. The participation of students in at least two extracurricular activities such as the lectures of the week of health, industrial engineering forum, workshop life and career plan and visit to Real de Catorce, was one hundred percent.

In the results of the life and career plan, the tutors showed interest in their self-development, especially in professional and transversal competences, for example, reading more, taking care of their health, expanding their culture, among others.

The attention activities to transversal problems are directed to the academic deficiencies that present the majority of the students and that are not exclusively of a learning unit, they are knowledge that occupy in all the professional careers. (García, 2010).

The institutional tutoring program promotes periodic evaluation exercises of its different actors, at different times and processes (Romo & Romero, 2015). At the end of this third period, the tutors evaluated the tutoring program and the performance of the tutors. The results showed their satisfaction with the activities carried out, highlighting the life and career plan and the extracurricular activities, see Graphic 8. The evaluation options were: A) The information provided by my tutor regarding the supports to attend to my opportunities for improvement was useful and sufficient. B) My tutor clarified my doubts regarding the remedial action for the integral calculus course. C) The oral health care conference helped me to deal with my current condition. D) The visit to Real de Catorce or Week of integral health allowed me to broaden my general culture or to become aware of my health care. E) The life and career plan technique used by my tutor helped me to set specific goals and know my strengths and weaknesses.



Graphic 8 APT evaluation
Source: Self Made

Conclusions

Through tutoring, we seek to accompany students to improve their performance, strengthen their autonomy and achieve their integral education (Romo & Romero, 2015).

The project is focused on the integral formation of the students, including the academic part. Group tutoring allows tracking and identifying the critical situations that students are going through, and makes possible the intervention with specific and timely actions, such as the remedial measures that were applied to the failure of integral calculus, which made it possible to reduce the percentage of group disapproval, from 29.5 to 5%.

In the survey that was done to the students who did not credit integral calculus in the previous semester, to know in their own voice which were the causes of the reprobation, they stated that the main cause lies in them, by not doing the tasks, not attend class, be late and have no study habits. So we will continue to work in a personalized way, so that they become aware of their responsibility and are not affected in their school career.

The results of the approval of the third semester show that the highest failure rate continues to be in the area of mathematics and that in this period it was particularly exacerbated by the fact that the curricular load is designed to take linear algebra and vector calculus simultaneously, for what should continue to work with the support that the institution has in the area of basic sciences to provide individual advice to students who require it.

The extracurricular activities contributed to the integral formation of the tutors, for example, the coexistence allowed the students to learn to adapt to different people, to be tolerant and to improve their communication skills.

The general health status review and subsequent discussions helped students become aware of their care; recreational activities contributed to broadening their general culture. The preparation of their life and career plan helped them to set concrete goals and know their strengths and weaknesses.

In order to confirm the effectiveness of the group tutoring in the study group, the APT evaluations and the performance of the tutors, showed that the information provided and the managed supports were useful for them.

It is concluded that the general objective has been fulfilled as projected to the third semester and that the specific objective of this period, had positive results in the increase of the professional and transversal competences of the tutors. The disapproval of advanced mathematics is still a topic of work due to its high incidence in the first semesters of the race.

There was a drop due to change of career and university.

Recommendations

As it is a long-term project, it is suggested that the APT of the following semester, contemplate activities that continue strengthening the professional and transversal competences of the tutors as part of their integral formation. Actions that include support to strengthen the learning of advanced mathematics, English, improve their reading skills and activities that encourage broadening their general culture among others, in addition to health monitoring.

Annex 1

Action Plan Tutorial applied in the period August December 2017.

Action Plan Tutorial
Department: CEA / Industrial Engineering DATE: 7 Sep. 2017
EDUCATIONAL PROGRAM: IGE / II Group: 1
SCHOOL PERIOD: Aug-Dec 2017
OBJECTIVE: To work in the integral formation in function of increasing the professional and transversal competences without neglecting the academic aspect.

Session	Activities	Date / Time / Place
1. Diagnosis / follow-up	1. Presentation of results of the previous semester. 2. Proposed remedial remedial action 3. Presentation of the APT 4. Presentation of supports (English) 5. Individual interview application (students who failed integral calculus	**Sep 13** 14: 00-15: 00 Audiovisual engineering
2. Health Monitoring	1. Feedback results of individual interview 2. Presentation of remedial action for the integral calculus course. 3. Conference on health care. (general and oral)	**Oct 5** 14: 00-15: 00 Audiovisual engineering
3. Cultural	1. Visit a Magical Town (Mineral de Pozos / Real de Catorce / Armadillo de los Infantes). 2. Potosino artistic event (check the municipal artistic agenda)	**Oct 27** 6 to 17 p.m.
4. Academic	1. Industrial Engineering Forum 2. Apply instrument to define life and career plan.	**Nov 17** 14: 00-15: 00 Audiovisual engineering
5. Evaluation of the APT	1. Feedback of life and career plan results. 2. Monitoring of academic performance. 3. Monitoring of health outcomes 4. Track English level.	**Dec 1** 14: 00-15: 00 Audiovisual engineering

Acknowledgement

We thank the National Technological Institute of Mexico / I.T. San Luis Potosí for the facilities provided to carry out this project and for the financing granted for it, as well as the participating students for their efforts in search of excellence.

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Article **Journal-Health, Education and Welfare**
December 2018 Vol.2 No.3 18-22

Analysis of the General Excess Exam for Isc and Strategy to Raise Approval Index

Análisis del Examen de Exceso General para el Isc y Estrategia para Subir Índice de Aprobación

CORONA-RAMÍREZ, Verónica†*, ENCISO-GONZÁLEZ, Angélica, LEÓN-OLIVARES, Eric and ESTRADA-REYES, Edna.

ID 1st Author: *Verónica, Corona-Ramírez/* **ORC ID:** 0000-0003-2825-817X, **Researcher ID Thomson:** P-7259-2018, **arXiv Author ID:** AFEDUC2765

ID 1st Coauthor: *Angélica, Enciso-González/* **ORC ID:** 0000-0001-6337-6847, **Researcher ID Thomson:** P-6568-2018, **arXiv Author ID:** AEnciso

ID 2nd Coauthor: *Eric, León-Olivares/* **ORC ID:** 0000-0002-6342-3719, **Researcher ID Thomson:** L-7445-2018, **arXiv Author ID:** MXINF2704

ID 3rd Coauthor: *Edna, Estrada-Reyes/* **ORC ID:** 0000-0002-5013-819, **Researcher ID Thomson:** P-7728-2018, **arXiv Author ID:** MXINF2766

Received July 28, 2018; Accepted September 30, 2018

Abstract

The General Graduation Exit Exam (EGEL) allows to measure the performance levels of students once they finish their degree. In this article, the results obtained in the general exit exam of the engineering career in Computer Systems of the Pachuca Technological Institute were analyzed. The competences that students must acquire to reach satisfactory levels of graduation were evaluated. the descriptive methodology that allowed visualizing the indicators to make decisions for the Department of Systems and Computing. The qualitative approach was used through observation techniques and interviews to evaluate various aspects of the student and the quantitative approach was added to validate statistically. In the same way, a strategy was implemented with the aspirants, increasing the approval rates of the General Exit Exam. undergraduate.

Desempeño, EGEL, indicators, strategy, learning

Resumen

El Examen General de Egreso de Licenciatura (EGEL) permite medir los niveles de desempeño de los estudiantes una vez que terminan su carrera. En este artículo se analizaron los resultados obtenidos en este examen de la carrera de ingeniería en Sistemas Computacionales (ISC) del Instituto Tecnológico de Pachuca, se evaluaron las competencias que deben ser adquiridas por los estudiantes para alcanzar niveles satisfactorios de egreso, así mismo se utilizó la metodología descriptiva que permitió visualizar los indicadores para tomar decisiones para el Departamento de Sistemas y Computación. Se utilizó el enfoque cualitativo mediante técnicas de observación y entrevistas para evaluar diversos aspectos del estudiante y se agregó el enfoque cuantitativo para validar estadísticamente. De igual forma, se implementó una estrategia con los aspirantes, logrando incrementar los índices de aprobación del Examen General de Egreso de Licenciatura.

Desempeño, EGEL, indicadores, estrategia, aprendizaje

Citation: CORONA-RAMÍREZ, Verónica, ENCISO-GONZÁLEZ, Angélica, LEÓN-OLIVARES, Eric and ESTRADA-REYES, Edna. Analysis of the General Excess Exam for Isc and Strategy to Raise Approval Index. Journal Health, Education and Welfare 2018, 2-3: 18-22

* Correspondence to Author (email: gpejauregui@itslp.edu.mx)
† Researcher contributing first author

Introduction

The National Center of Evaluation for Higher Education (CENEVAL) in the year 1994 that began, has played an important role for educational evaluation in Mexico. This body designs and applies tools for the evaluation of knowledge, skills and competences.

An indicator of educational quality is determined by the number of supporters of an Educational Program (EP) who manage to obtain an outstanding or satisfactory testimony in the General Exit Examination of the Degree (GEED) that CENEVAL applies.

One of the instruments that exist in our country to evaluate the results of the educational process at the higher level is the General Graduation Exit Exam (GEED), this test of learning, standardized and specialized by degree, with a national and institutional scope, comply with the purpose of providing valid and reliable information that helps determine the degree of suitability of each graduate with respect to a standard of training and performance established.

Objective

Analyze the GEED results of the Computer Systems Engineering students and apply a strategy to raise the approval ratings.

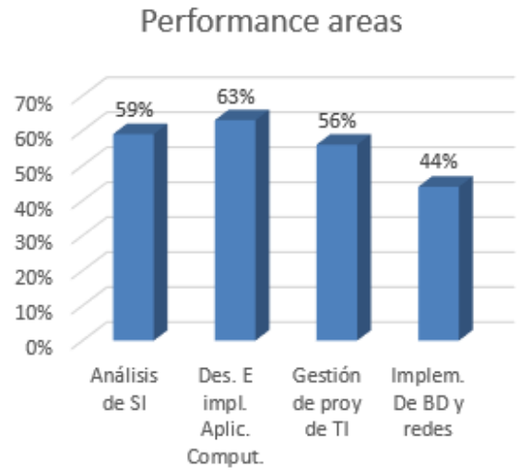
Approach the problem

The GEED is considered by some universities as a requirement of graduation and / or graduation, as is the case of the Technological Institute of Pachuca.

The non-accreditation of the GEED impacts two important moments, first, in the efficiency of graduation when a student does not carry out the application of the exam, and in a second moment, in the efficiency.

For the Department of Systems and Computing of the Technological Institute of Pachuca, the results obtained in the application of the General Degree Exit Exam are worrisome.

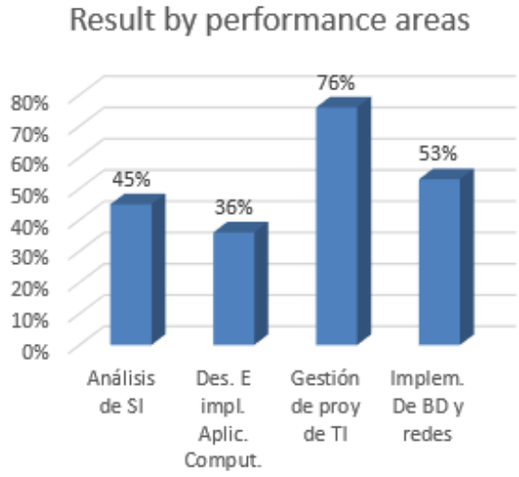
According to the statistics of 2017, 27 students attended the GEED, only 10 were approved, that is, 37%; 17 students failed, representing 63%, so there was a concern to detect performance areas to be reinforced with students enrolled in the race.



Graphic 1 GEED performance areas

Analyzing the results of the supporters presented by GEED in March 2017, as shown in figure 1, it can be seen that the area that needs strengthening in the Department of Systems and Computing is the Development and Implementation of Digital Applications.

In the second period of application of the GEED exam that was in September of 2017, it can be seen that out of 40 students who submitted the GEED, only 45% passed, so the score in the performance areas was analyzed, because the 55% had failed.



Graphic 2 Results of areas of performance sept 2017

ISSN-2524-2075

In figure 2 it is contemplated that in the area of performance Management of Projects of Technologies of Information it is necessary to reinforce the contents of the matters, like Software Engineering, Management of software projects and Management of the Quality of software.

Methodology to be developed

A retrospective, observational and descriptive methodology was used to detect the key elements that influence the failure rates of the general exit examination. By observing and analyzing data, other factors were found that affected their score.

The following steps are described below:

1. A sample of 29 applicants was selected to take the general exit examination.
2. The results of 2017 were analyzed.
3. We investigated the best strategies applicable to the characteristics of students to strengthen the performance areas of Development and Implementation of Digital Applications and Management of Technology Projects.
4. Reagents from the aforementioned performance areas were performed and applied to the supporters.
5. The results were analyzed.

Theoretical framework

The exam is organized in areas, sub-areas and topics. The areas correspond to professional areas in which the work of the software engineer is organized (Benitez, Aguilar, 2015).

The areas that CENEVAL evaluates in Software Engineering are:

a) Analysis of information systems
b) Development and implementation of computational applications.
c) Management of Information Technology projects.
d) Implementation of networks, databases, operating systems and development languages. (Torres, Guillermo, 2016).

Below are described two areas of performance that CENEVAL manages in which the supporters who applied the exam came out lower.

One of them is the area of Project Management of Technologies that implies having the knowledge to apply the resources of the project through the identification and evaluation of quality processes (CENEVAL, 2018).

The other area of performance is the Management of Projects of Technologies that considers to take satisfactorily the following steps:

1. The definition of requirements
2. Selection and contracting of the supplier
3. Identification of the scope of the project
4. Identification of the development methodology
5. Active participation of customers and users
6. Proper administration and communication with the provider.

The determination of requirements consists of the process of analyzing, documenting and verifying services (Sommerville, 2010), for which two types of requirements are distinguished:

Functional requirement is the declaration of the services that the system will provide, so that it reacts in particular situations.

Non-functional requirement refers to the restrictions of the services or functions offered by the system.

Mastering the performance area of Development and Implementation of Digital Applications implies that different technological environments are known and that the student is able to implement the technological solution, based on the adjustment of tests, integration and operation, applying formal methods. One of the formal methods is the white box and black box test (CENEVAL, 2018).

The white test is a test case that uses the control structure described as part of the component-level design to derive test cases (Pressman, 2010).

You can derive the following test cases that:

a) Ensure that all independent routes within a module were reviewed at least once.
b) Review the logical decisions on both their sides, true and false.
c) Execute all loops in their borders.

The black box test focuses on software functional requirements, allowing the derivation of sets of input conditions that will completely revise all the functional requirements of a program.

The software used to work with the reagents of the two aforementioned areas was the Hot Potatoes, where a bank of projects was worked on by the teachers to incorporate them with the pre-exam reagents. (Valenzuela, López (2013).

Hot Potatoes is an application with which you can develop up to 6 different types of educational exercises for a Web page (CEIP, 2014).

The tools included in the program are the following: JQuiz, JCloze, Jmatch, JMix, Jcross and the Masher.

JCloze allows you to create a list of sentences in which the user must guess the missing word.

JQuiz present a scheme to elaborate multi-response questionnaires.

With the JMatch you can generate drag-and-drop exercises in which the user relates a word from one list to another.

JCross helps to perform crosswords with the words that are entered.

The JMix is possible to indicate a phrase so that the supporter orders words or letters.

Finally, The Masher allows you to compile the rest of the exercises and generate an HTML document (Martínez, 2006).

Results

Once the information was concentrated, it was observed that in March of 2017 only 37% were approved, in September of 2017 45% and in April of 2018 with the application of the strategy 59%.

It should be noted that the performance of the supporters is given in accordance with the range of points obtained in the evaluation, the description of the performance levels allows knowing what problems and situations are capable of resolving the supporters when it reaches a satisfactory performance, and which ones, when it reaches an outstanding performance (CENEVAL, 2018).

A questionnaire was applied with 50 items related to the performance areas of Development and Implementation of Digital Applications and Management of Technology Projects.

As a result of this application and the presentation of a total of 29 supporters in the GEED applied in April 2018, an increase in the approval rate of 59% is seen.

Table 1 shows the number of people who approved the GEED and its percentage of approval.

Year	People who presented the GEED	Approved	Approved%
March 2017	27	10	37%
September 2017	40	18	45%
April 2018	29	17	59%

Table 1 GEED results

It is not about opening remedial courses to increase the approval rates of the GEED, but to strengthen the contents of the Computer Systems Engineering program, plan 2010-225.

Conclusions

It is of vital importance that the Directors and teachers of the educational program of the Computer Systems Engineering career consider observing the trajectory of the results obtained by their graduates in the GEED, as they are indicative to determine which contents of the study plan should be reinforced to ensure that the supporters meet the graduation profile requirements of the race.

ISSN-2524-2075

The presentation and accreditation of this exam as part of the certification process, is one reason why today the GEED test is a mandatory scrutiny for all students who complete any career, it allows to measure the level of knowledge and skills acquired during the race.

That is why the Department of Systems and Computing of the Technological Institute of Pachuca has been concerned to achieve satisfactory results for the supporters, generating as main objective, the increase in the approval rates.

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Article **Journal-Health, Education and Welfare**
December 2018 Vol.2 No.3 23-28

Scientific literacy. Inquiry on the skills fostered by public high school students

Alfabetización científica, indagación de las habilidades fomentadas que la propician en alumnos de secundarias públicas

RODRIGUEZ-RUIZ, Ana Elena†*, CACERES-MESA, Maritza Librada, MORENO-TAPIA, Javier and RODRIGUEZ-CASTILLO, Mario Emigdio

ID 1st Author: *Ana Elena, Rodriguez-Ruiz* / **ORC ID:** 0000-0002-0077-3164, **Researcher ID Thomson:** P-7226-2018, **arXiv Author ID:** AnaElenaRodriguez, **CVU CONACYT ID:** 895106

ID 1st Coauthor: *Maritza Librada, Caceres-Mesa* / **ORC ID:** 0000-0001-6220-0743, **Researcher ID Thomson:** T-8805-2018, **CVU CONACYT ID:** 905279

ID 2nd Coauthor: *Javier, Moreno-Tapia* / **ORC ID:** 0000-0003-4029-5440, **Researcher ID Thomson:** U-5134-2017, **CVU CONACYT ID:** 431070

ID 3rd Coauthor: *Mario Emigdio, Rodriguez-Castillo* / **ORC ID:** 0000-0003-2153-2105, **Researcher ID Thomson:** P-5374-2018, **arXiv Author ID:** EmigdioRodriguez, **CVU CONACYT ID:** 122992

Received July 28, 2018; Accepted September 30, 2018

Abstract

In the mexican educational context the first grade of high school level means the ending of basic education, which has as porpuse certain achievements at the end. Today in a society with scientific and technological advances it is necessary that each person is scientifically literate. For this research it has been considered as subjects of study to third grade students and this project would help to characterize the needs around scientific literacy in two different specific environments, also giving an idea about the processes and results of educational actions; with the support of a qualitative evaluation by applying a focus group with science teachers, observations to classes, and revision of the student's notebooks as a methodological strategy to triangulate the information obtained. The objective requires the determination of scientific literacy skills that are being fostered in the students considering integrating the results of the study. It is inferred that these are based on the characterization of the skills related to the achievement of the graduate profile that have been identified and the conclusions of the study are about the role of scientific literacy in the development of motives and interests in students to strengthen the science learning.

Scientific literacy, Skills, Public high schools

Resumen

En el contexto educativo mexicano el nivel secundaria es la culminación de la educación básica, que tiene como propósito ciertos logros al finalizarla, hoy día en una sociedad con avances científicos y tecnológicos es necesario que cada persona sea alfabetizada científicamente. Para esta investigación se ha considerado como sujetos de estudio a los alumnos de tercer grado, este proyecto ayudaría a caracterizar las necesidades en torno a la alfabetización científica en dos entornos diferentes específicos y dando una idea acerca de los procesos y resultados de las acciones educativas; con apoyo de una evaluación cualitativa aplicando un grupo focal con los profesores de ciencias, observaciones a clases, y revisión del cuaderno de notas de estudiantes, como estrategia metodológica para triangular la información obtenida. El objetivo precisa la determinación de habilidades de alfabetización científica que están siendo fomentadas en los alumnos, considerando integrar los resultados del estudio. Se infieren que éstos se sustenten en la caracterización de las habilidades relacionadas con el logro del perfil de egresado que se han identificado, las conclusiones del estudio versan sobre el papel de la alfabetización científica en el desarrollo de motivos e intereses en los estudiantes para fortalecer el aprendizaje de ciencias.

Alfabetización científica, Habilidades, Secundarias pública

Citation: RODRIGUEZ-RUIZ, Ana Elena, CACERES-MESA, Maritza Librada, MORENO-TAPIA, Javier and RODRIGUEZ-CASTILLO, Mario Emigdio. Scientific literacy. Inquiry on the skills fostered by public high school students. Journal Health, Education and Welfare 2018, 2-3: 24-29

* Correspondence to Author (email: annita181990@gmail.com)
† Researcher contributing first author

Introduction

One of the approaches that has basic education oriented to scientific training aims to develop skills for inquiry and understanding of natural phenomena and processes, as well as informed decision-making in scientific and technological issues of individual and social importance (SEP , 2017). In the context of the 21st century advances in science and technology have conditioned humanity to acquire a large body of scientific knowledge, so it is necessary that each person appropriates them in a meaningful way for their lives, that allows them to be able to understand and make decisions under daily situations occurring on the natural environment and the changes suffered by human actions. In this way scientific literacy is an emerging approach that gives science a priority position in the formation of a general culture in all contemporary citizens, as it enables them to make decisions related to understanding the world and different problems related to it. That is what is known as scientifically literate, although the term does not yet have a single and agreed definition. One can speak with certainty that this concept was born by the need to name what would solve the deficiency of knowledge of society in relation to the knowledge of science, so it is not surprising that international educational policy organizations were the first in emphasizing scientific literacy.

In the work of Ramos (2013) can be observed analysis of the results in the PISA assessment test for the science area, which is understood as scientific competence; this test is carried out on 15-year-old students, and although the research concludes about the low complexity that the test demands, the results that Mexico has are well below the average with 416 points against 493.

The scientific competences evaluated in PISA are three: explain phenomena scientifically, evaluate and design scientific inquiries, and interpret data and evidence scientifically (Yus Ramos, and others, 2013).
In Mexico the secondary level of education has three modalities: Secundaria Técnica, Secundaria General, and Telesecundaria, where the science program aims for certain achievements when completing this basic education and in particular when graduating third grade students.

It is worth mentioning that each of these modalities and each one of the schools that make up these modalities have particular characteristics in relation to economic, infrastructure and human resources, so this was also planned when choosing the sites of interest.

That is why for this research has been considered as subjects of study to the students of this degree, which are located in particular in the Secundaria General Lic. Jorge Viesca Palma of the Municipality of Atotonilco el Grande, and Telesecundaria No. 644 from the Ignacio López Rayón community belonging to the municipality of Omitlán de Juárez; both in the state of Hidalgo.

In this field from a personal perspective in the context of the teaching practice and in interaction with other teachers the need to implement teaching strategies is considered, which allows awakening motives and interests in the students for the learning of the sciences, where it is overcome the mere transmission of the contents. It has been observed that the majority of students tend to reject classes related to science, because of their previous experiences that provoke an apathetic attitude to learn new content.

There is a current need to promote scientific vocations, which is born due to the concern of the decline or stagnation of university enrollments in areas of exact sciences.

Natural sciences and engineering that are key to face the future challenges that productive systems have and economics of the contemporary democracies of Latin America (Albornoz, 2011).

Due to the aforementioned the research project in question allows to characterize the needs around scientific literacy in two different specific environments defining the magnitude of the problem around its teaching, through which at the same time it could give an idea about of the processes and results of educational actions. This would contribute and would mean an information base from which future research is generated, that will allow opening options for political and administrative decisions regarding education.

ISSN-2524-2075

So it can be thought that in spite of the poor performance shown by international tests such as PISA of Mexican students in Science areas with the aim of Scientific Literacy certain skills are being fostered in high school students that are related to the achievement of the goal of long-term scientific literacy, although in this grade they are not reaching it completely.

Scientific Literacy

The concept in question already has a history behind that has led it to undergo a transformation with the passage of time, the evolution of society, and with it the evolution also of technological and scientific advances of the day to day. The conceptualization of scientific literacy goes back to the end of the 50s, however the last two decades has acquired a higher category of slogan broadly and repeatedly used. (Bybee, 1977; in (Sabariego del Castillo & Manzanares Gavilán, 2006)).

Most definitions include aspects that state that scientific literacy is not only about acquiring knowledge of science and technology concepts, but that in order to support these theories and laws there must be an understanding of knowledge and its scope in order to understand the natural and artificial world. Some authors, such as Vallés, Niebla, and Sabariego, within this understanding mention it as having reflexive and critical attitudes about situations and problems that occur on a day-to-day basis.

In Sabariego (2006) mention the scientific literacy as a tool of knowledge and skills for the resolution of basic health and survival needs, which could lead to a discussion about whether it would be prudent to consider it in such a way. Since the science and technology of today is not based solely on the search for such ends of basic needs, however if it is common knowledge in all definitions that seeks to consider scientific literacy as a basic capacity for every citizen.

It is precisely today's society completely surrounded every day by new scientific and technological developments, which leads different authors to involve within the concept the understanding of social impact also taking into account the misuse that science can generate, so they involve the values and attitudes that must be possessed to be part of scientific activities.

Which involve both researchers and any citizen who must be able to express a point of view in the daily scientific debates.

Several authors such as Bennassar & others (2010), Senar & others (2017), Vallés & Arranz (2013), use within the definition of scientific literacy the concept of Nature of Science and Technology (NdCyT - for its acronym in Spanish) (NOS - for its acronym in English); a definition that from a personal perspective is still in formation.

This opinion is derived from the definitions of various authors; Niebla G. (2014) says that there are still many disagreements about the NOS among philosophers, historians, sociologists, and scientific educators, although there are shared elements. In Temel (2017) mention is made of the controversial nature of this concept and this is due to its complexity, since it is dynamic and its understanding requires the understanding of a nature of experimental and changing scientific knowledge. But it can be defined through these authors and also supported by Lederman (1992) in Niebla, that the NOS refers to epistemology, to the sociology of science, and to the values and beliefs inherent in scientific knowledge and its development.

For what to teach to think scientifically in the scope of the process of teaching and learning requires skills that are acquired throughout the process of teaching and learning of sciences, by means of which the teacher generates diversity of learning scenarios that stimulate curiosity, discovery, search, inquiry and research in their students.

Studies about Scientific Literacy

The preparation of the state of knowledge entitled "Production on scientific literacy in science education in secondary and high school education, in a period of 2003-2018", has allowed to observe that the investigations carried out up to now, like those of Archila (2015), Guevara (2014), Love (2014), Lynn (2008), Lynn (2016), Romo (2008), Vallés (2013), among others, have focused on evaluating particular aspects or skills pertaining to scientific literacy; and in Mexico the studies consulted are similarly coincident with this characteristic, or of intervention for evaluation of pedagogical proposals.

ISSN-2524-2075

This inhibit for the particular case of Mexico to detect the weaknesses, or in its case strengths that are or are not developing in the students of the country; showing real results based on the current situation of the Science Program of the SEP in its different application environments, and avoiding conclusions that refer to the mere conclusion about the lack of scientific literacy in the third-year secondary students.

SEP´s Natural Sciences and Technology Program for Basic Education

The teaching of Sciences in Mexico with the reforms of 2003, 2006, and 2011 (RIEB-Integral Reform for Basic Education) has highlighted the importance of science in the integral formation of students, in which it is promoted that during and at the end of basic education, students are involved in the responsibility to develop their "competences for life". These proposals can be found in the study program of the SEP (2011) and should be seen as a series of knowledge that the student is building throughout his life and not only in formal education but also in informal education (SEP, 2011), for which the teacher is required to have a profound command of the scientific content that he teaches.

The new Plan and Study Program for the basic education of Natural Sciences and Technology of the SEP (2017), has the substantive intention of contribute in the formation of a citizenship that participates democratically, with foundations and arguments in the taking of decisions about scientific and technological issues of individual and social trascendence (SEP, 2017).

It is also mentioned that students develop critical and creative thinking skills that respond among other characteristics to the cognitive and attitudinal requirements of students.

They should also be able to develop inquiry strategies to understand scientific processes, as well as argumentative skills, among other in accompaniment of attitudes and values towards science and technology.

With the aforementioned we can already see a list of skills that third-grade students should develop and can also compare certain characteristics mentioned in the science program with the definition of scientific literacy, that could be deduced are similar for not daring to say that it corresponds totally to the profile of graduated that SEP intends to complete the basic education.

Methodology to develop

A participatory methodology based on reflection on one's own teaching experiences will be used. The instrument that sustains the diagnostic process, which allows to characterize the literacy that third-year secondary students are acquiring, would be around the new Plan and Program of study for basic education of Natural Sciences and Technology of the SEP (2017); which is applied in the two different environments and by means of a qualitative evaluation it would be supported to have a panorama about the achievements and deficiencies that are being obtained; for this it is considered to apply a focus group with the teachers of these subjects, observations to classes, revision of the notebook of students' notes, as a methodological strategy that allows to triangulate the obtained information.

All this from the objective of study that requires the characterization of the scientific literacy skills that are being promoted in third-year secondary students of the modalities of Telesecundaria in Omitlán de Juárez, and of Secundaria General in Atotonilco el Grande in Hidalgo.

From which it is necessary considering integrating the results of the study from the subjects involved in the research context.

Likewise the activities carried out in the field of the teaching and learning process will be analyzed, among which are required of problem solving, experimental situations and analysis of didactic situations, from the point of view of the investigative component and of the cognitive demand generated in the students.

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Results

It is inferred that the results are based on the characterization of the skills that have been identified that are being promoted in high school students and that these are related to the achievement of the objective of long-term scientific literacy. That is for each of the environments studied the specific skills that are being developed by the students will be cited, as well as the strategies that are used by teachers to promote them; and compare these observed achievements with the objectives of the SEP 2017 science program in order to detect strengths and opportunities offered by this program and its application in different contexts.

Conclusions

The conclusions of the study deal with the role of scientific literacy in the development of motives and interests in high school students to strengthen the learning of science, where the role of science in the education of 21st century citizens is rescued.

Likewise to highlight the observed characteristics and todetermine to what extent the resources of the schools impact on the application of the current program of Sciences of the SEP.

Recommendations

The main findings in the study of scientific skills promoted in high school students should be developed at the baccalaureate level, in order to promote the scientific vocation of these throughout their formative journey, as a foundation that allows transit to school. Bachelor's degree, as a constructive citizen, committed and reflective with his time in the contemporary scientific and technological field.

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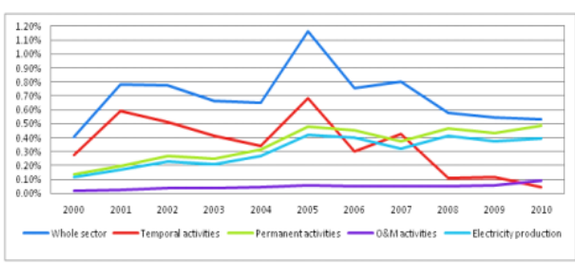

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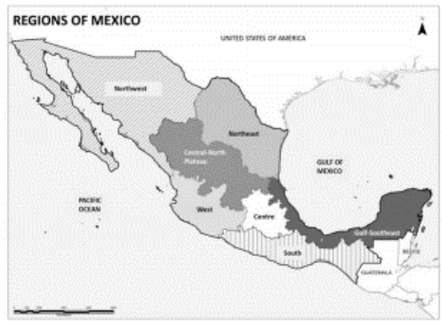

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