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Profile of female students of engineering universities in Mexico and Spain

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Abstract

Gender studies in higher education have emerged in parallel to reflections and rising feminist movement. The main objectives of academic feminism are related to women's visibility improvement as well as soft skills developers' roles. But a gap in TECH studies can be detected. Women studies in higher education are mostly related to life and social sciences, behavioral, journalism and information, business and management and law, in contrast to engineering, architecture, manufacturing, construction, ICT or any kind of TECH studies. Thus, the main objective of this work is related to survey design in order to develop a qualitative research to inquire about TECH higher education, female population profile, both at UdG-CUALTOS (Guadalajara, Mexico) and UPC (Barcelona, Spain). This profile can provide some influential identity elements, related to perceptions and expectations of women-TECH, deemed appropriate from their professions as engineers. From these results, it should be possible to draw gender alternatives for future generations in TECH environments.

Keywords: Gender studies, women students, engineering, higher education, expectations.

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1. Introduction

The beginnings that marked the different studies available for men and women come from the reflections generated around feminism, position deconstructs reality in order to re-build it from an analysis of the participation of women. Studies of gender and education, allowed showing these realities. The first studies that emerged on the analysis of Higher Education (HE) came to determine various differences in enrollment, where the low participation and recognition of women in the area of engineering and in some other areas where absences are displayed. Currently these low records continue to prevail in certain areas and fields of study. The intent of this research is to implement strategies that begin to foster an egalitarian speech in the medium and long term, in order to blur these areas of participation gaps between women and men in higher education.

On women and the professional field, studies that revolve around quantitative and qualitative approaches have been conducted. Some realize the natural preference and student's choice of area of study that has come to be considered as traditionally for male or female. According to an analysis by UNESCO (2012) in the field of study and in line with other studies, the following records in Figure 1 are demonstrated.

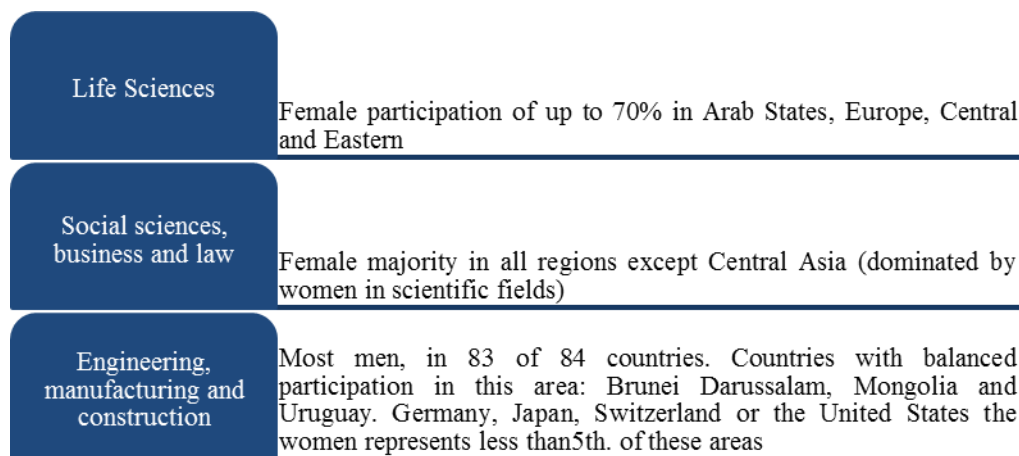


Figure 1. Fields of study, participation of women and men in the HE. Based on data from UNESCO (2012)

From this perspective of career decision, studies show the environmental implications for the choice of field of study. The compendium of UNESCO (2010) relates it according to preferences set by the trajectories of people, their realities and material conditions, whether male or female; likewise cites the preference field of study and the type of employment as the result or product of the interactions of macro variables, factors and forces intermediate micro level, where each is represented in the same order: The national contexts and international, linking educational establishments and to the field of study and finally to individual and family influences. Moreover, the choice of career involves a number of aspects such as structural conditions, expectations and beliefs of the family, the perception of career success and school, with the conduct, behavior reinforced the aspects that are given greater weight (Macias, 2016).

The report on HE of the Secretariat of Public Education (SEP) having Malo (2014) in Mexican territory shows a total enrollment in HE in the 2013-2014 school year more than 3 million students, almost an entire 4 million. This registration cake is divided equally in the participation of women and men, either as states across the country. The data show that almost 43% students are placed in social and administrative areas, approximately 36% in engineering and technology, and then 10.5% in the area of health and lower rates; 6.5%, 2.5% and 2% the area of education and humanities, the agricultural area and end area of natural and exact respectively.

Similarly, participation trends in the area of study in each of the states is mostly similar to the national average, except for some entities that have greater variations in recording data in engineering and technology rather than social and administrative area . The information from the Statistical Yearbook ANUIES for the cycle 2013-2014, in higher technical degrees for the State of Jalisco has a total stake of 225,729 young people, of which 51% are men and 49% women. This equal participation has particularities by broader field of academic records. Particularly a major share of men in the area of engineering, manufacturing and construction is seen as natural, accurate and computing, agriculture and veterinary sciences and finally health. Women are mainly located in; law and humanities and social sciences education, administration, health and arts (Macias, 2016). In the case of the Centro Universitario de los Altos (CUALTOS), the situation has been similar, the areas of engineering have been in those that have lower female participation records (Macias, Caldera and Iniguez, 2011).

Recent researches in the Spanish environment (Marquez and Salan, 2012; Unez and Salan, 2015) has aimed at deepening the choice of profession career of engineering. There have been various reports, action plans to carry out strategies favoring and supporting gender equity, such as the Report on the careers of women in the scientific and academic fields and the existing glass ceiling, which come from the Commission of Rights of Women and Gender Equality of the European Parliament. Similarly, other agencies shed light to the realities, such as the sites like the website of e-igualdad.net, made explicit statistics to mention that only 33% of young Galician opts for studying scientific disciplines in high school.

2. Profiles of women TECH

In studies of enrollment, the low presence of women in branches of technology areas has been demonstrated. In the case of Cataluna, the document prepared by Unez and Salan (2015) has attempted to determine the reasons for the departure of women from technology. On the one hand, the research had addressed various factors such as gender stereotypes, self-esteem, attitude to studies, family influence in the secondary stage and high school, collected through surveys and interviews to a public school and on the other hand, has ventured to recognize the influencing factors among young people, represented by the media and the school context.

The situation of women in Spain, from the case of universities polytechnics, and with the intention of approach the environment for women in the field of TECH, some results based on this approach are presented in this context. Originally, a first impact on the student, it can be appreciated from the teachers who are attending universities or educational institutions.

In the study of the academic career of teaching staff in Spain universities of technology developed in 2013 by Marques, Salan and Tura of the Polytechnic University of Cataluna and published by the university in collaboration with the Ministry of Research, Development and Innovation (Ministry of Economy and Competitiveness), the Polytechnic University of Cartagena, the Polytechnic University of Madrid and the Polytechnic University of Valencia presented an approach from the profile of the student, their academic career, their family conditions, their comments on discrimination and on the reconciliation aspect presents. The indicators addressed revealed the segregation of teachers, where between the percentage of male and female representation in the organizational structure, a gap is perceived in favor of the male sector. On the knowledge areas the document reveals that the number of women professors is very low in all areas of knowledge, even in areas where there is greater representation of women, for example the case of the specialty in pediatrics. The analysis of family conditions refers to sharing responsibilities, being couples, or family.

In the case of Spanish environment, the percentages in which the environment is displayed TECH, women's participation is less than 30% overall, and distribution enrollment does not keep them equally, because there are degrees in which there are more women (architecture, bio engineering,

agronomists, optical) and some in which the presence is very low (ICT, electronics, electricity, automatic).

As another influence of macro level, institutions appear. The white paper discusses gender differences in science education with detailed empirical evidence for Alloza, Anghel and the Rica (2011) and in the scientific career, from the contributions of Anghel, the Rica and Dolado (2011). In the same case of the professors in the areas that focus are the humanities, followed by the natural sciences, then in medical and social sciences, and finally with a lower figure of 10% are located in technical careers, and appears as worrying some areas where women's presence is negligible, as some areas of the natures and medical sciences, including engineering and technology.

In the Mexican case, the faculty of engineering of the Universidad Nacional Autonoma de Mexico (UNAM) the population of degree in 2013 consisted of 20 per cent of women and 80% of men, in the case of the postgraduate studies was integrated by: 28% women and 72% of men. The results of the study conducted at the Centro Universitario de Ciencias Exactas e Ingenierias (CUCEI) de la Universidad de Guadalajara in Jalisco, by Aguiar and Gutierrez (2015) it is revealed that if it is of interest to have greater representation of women in careers in science, engineering and technology it is necessary to consider the negative factors affecting it. In the study, impact of two areas is determined: The first mentions the school context, where the curriculum should include more aspects related to girls and teenagers with a focus on improving the learning of science and mathematics; preparation of teachers to give equal treatment; greater integration of vocational guidance to promote interest in mathematics and school and parents where the integration of women in these careers rescue work. And in a second area, which the authors would rescue work environment where they can give space to meet their children. Similarly in this research it is evident that the analysis of academic performance allows being visible before entering college, women have a slight advantage over men in the overall results, although men do better in mathematics and science and women in language. Academic results in Mexico assessments made in higher education show that women gain lower scores than men, and that this phenomenon is repeated in the central university where engineering courses are held.

The position of the authors of this research can go hand in hand with some reflected ideas in this study predominantly of institutions providing technological careers but should revise labor issues and go beyond to leave spaces for the care of the traditional responsibilities, for it would work from the perspective of conciliation and co-responsibility.

3. Research design

This research began at the results from studies on the analysis of enrollment in higher education, when viewing the low participation of women by field of study. And in turn, to assess the context of development and the absence of women in science and engineering; by the concern to show the range of possibilities not yet envisioned as individuals, simply because they have access to it, the environment does not allow it or stay away from an experience that arises. The investigation of Sax (2012) from UCLA, shows the detail of its implementation in other countries in addition to Spain and Mexico. In this sense, the project in question to be developed by the responsible, concerned about this challenge, intends to commence micro level (between researchers from two universities) with a shared approach between two countries, the intention is to make in the fields of study is where significant differences in participation between men and women are, it may encourage the trend in the medium and long term change. In this way it is valued to begin working with a proposal that involves decisions and issues of vocational guidance, they begin to take shape from the student's own experience as the main actors.

3.1 Type of research

This research employs a mixed design approach with qualitative and quantitative methods. In depth interviews will be used and the quantitative stage will be carried out through a questionnaire, over a survey. The population will consist of the students who attend engineering at the Universidad Politecnica de Cataluna, (UPC) and the Universidad de Guadalajara, Centro Universitario de los Altos (UDG-CUALTOS).

3.2. Instrument

The interview guide and questionnaire survey will be integrated into the following dimensions of analysis:

- I. Profile of engineering studentII,Family data
- III. Reasons for career choice
- IV. Personal moment of career choice
- V. Why and others not elected?
- VI. Issues for determining career choice
- VII. People who approved your decision in the choice of career
- VIII. Perceptions of personal satisfaction of the career
- IX. Career expectations
- X. Recommendation of the career
- XI. Recommendation for the career chosen
- XII. Path labor activity
- XIII. Personal traits
- XIV. Models or stereotypes

The instrument dimensions have their theoretical argument based on the factors listed by UNESCO which were introduced earlier. Also theories of career development, vocational interests, integrating a gender perspective will be taken into account.

Some instruments have been developed previously in both universities. The team that had implemented these tools works with the authors of this document. The objective of these instruments had varied. The survey conducted in Spain shows the profile of students of technology; this instrument was developed at the UPC by Unez & Salan (2015). The Mexican antecedent in UDG-CUALTOS is the instrument developed by Caldera (in press) is about reasons for admission to the studies of health sciences.

4. Conclusion

The current students of the tech careers, both women and men will support the actions of vocational guidance that could work to promote career choices in areas of equality.

Gender alternatives are displayed for future generations can be expanded with the inclusion of the views from the actors themselves, and from the study of Spanish and Mexican cases. Women now turn to studies "bio" and "eco" in which the relationship between engineering and social commitment is evident. But in those degrees that is not so immediately "beneficial effect" of female talent, women are not attracted.

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