Female computer engineering students obtain better grades and prefer more people-oriented specializations: Report

October 26 2023, by Tania Alonso

Credit: Pixabay/CC0 Public Domain

In academic year 2021/2022, men formed a clear majority of students studying for a Bachelor's Degree in Computer Engineering in Spain. According to the report "Igualdad en cifras" ("Equality in Figures") published by the Spanish Ministry of Education and Vocational Training, only 14.1% of all students taking that program were women.

This highlights a reality that will come as no surprise to anyone: women are seriously underrepresented in STEM disciplines (science, technology, engineering and mathematics). So what happens once they get into the classroom? Do men and women differ in terms of performance and specializations?

These are some of the questions examined by the researchers from the STEAM University Learning Research Group (EduSTEAM) Julià Minguillón and Maria Jesús Marco-Galindo; Elena Planas from the SOM Research Lab group at the Internet Interdisciplinary Institute (IN3) and Josep Maria Marco-Simó. They are all also members of the Faculty of Computer Science, Multimedia and Telecommunications at the Universitat Oberta de Catalunya (UOC).

They have published an open-access paper—¿En qué se diferencian las graduadas de los graduados en su trayectoria en el Grado en Ingeniería Informática? El caso de la Universitat Oberta de Catalunya (How do the pathways of male and female Computer Science graduates differ? The case of the Universitat Oberta de Catalunya)—which received an award at this year's JENUI conference on teaching computer engineering at university (JENUI 2023).

One of the conclusions of the study is that women starting a Bachelor's Degree in Computer Engineering do so with more prior learning than their male peers, perform slightly better and choose different pathways.

More prior experience and better performance

Many studies have analyzed the gender gap in Computer Engineering studies, but not so many have examined the performance of female graduates while at university, as the UOC researchers have done in this paper revealing the situation at the university.

The differences start with the students' profile: women join the program having already either started or completed a university degree, whereas men tend to join from advanced-level training cycles. According to the authors of the study, this affects their choice of pathways.

The authors interpret that already having a degree means that women are better prepared—or at least have more academic experience—when they start the Computer Engineering program. "Women generally get better grades, particularly in more theoretical pathway (Computational Engineering) and graduate one semester earlier. This latter fact is partly due to having more credit recognition from courses they've already studied," said the authors.

Different pathways

According to the study, the difficulty of courses does not significantly affect female students' choices. However, what does affect them is the number of courses they still need to take (as a result of credit recognition) and the reality of the glass ceiling. In other words, they choose fewer courses aimed at gaining managerial positions and positions of responsibility within organizations, such as Information Systems. This choice is consistent with the difficulties often encountered by women in such positions.

Furthermore, the results of this research by the UOC reveal a clear difference between the chosen pathways of male and female students. Most women take the software engineering route, software, which

focuses on creating solutions that can be applied to people's lives. Men tend to be more varied in their choices, although with an overall preference for Information Systems.

According to the researchers, women tend to choose courses relating more to developing applications and user interaction, i.e., from the computer out, whereas men tend to prefer hardware and systems development, i.e., from the computer in.

Breaking stereotypes

This study by the UOC debunks two myths: that women don't have the right skills to study Computer Engineering and that they don't enjoy programming. The authors of the study believe that highlighting this is key to promoting equality, diversity and innovation at university.

"Quantifying and identifying barriers, biases and disparities enables us to create a more inclusive environment with equal access opportunities for men and women. Furthermore, addressing gender differences helps establish models to be followed, propose policy changes, achieve global competitiveness and create a society that is fairer and more equitable," they said.

Likewise, the differences in technology programs between men and women relate to values linked to gender roles that, according to Milagros Sáinz, research group leader at the IN3's Gender and ICT group (GenTIC), are transmitted to both men and women.

"The gender gap in science and technology programs is a complex phenomenon whose origins are linked to the fact that our society is based on a set of values linked to gender roles and stereotypes that are transmitted to men and women through socialization processes that are different for each group," said Sáinz.

"Men are expected to be assertive, competitive and even aggressive, or to want to take an interest in objects. Women, on the other hand, are expected, for example, to properly express their feelings, take an interest in people and enjoy taking care of other members of society," she said.

This study by the UOC reveals the differences observed between men and women, but it does not examine in detail the reasons behind each group's decisions. It therefore leaves the door open to future research that will help clarify the causes of this inequality so that we can tackle and maybe even overcome them.

More information: Full report: easyconf.org/django/ecmp/media … paper_56_EaSj0FH.pdf

Provided by Universitat Oberta de Catalunya (UOC)