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Using databases to improve the visibility of women’s contributions in STEM fields

Carmen Botella-Mascarell
carmen.botella@uv.es
Computer Science Department
Universitat de València
46100 Burjassot, Spain

Anabel Forte
anabel.forte@uv.es
Dept. of Statistics and O. R.
Universitat de València
46100 Burjassot, Spain

Emilia López-Iñesta
emilia.lopez@uv.es
Dept. of Didactics of Mathematics
Universitat de València
46022 Valencia, Spain

Esther de Ves
esther.deves@uv.es
Computer Science Department
Universitat de València
46100 Burjassot, Spain

Silvia Rueda
silvia.rueda@uv.es
Computer Science Department
Universitat de València
46100 Burjassot, Spain

Xaro Benavent
xaro.benavent@uv.es
Computer Science Department
Universitat de València
46100 Burjassot, Spain

ABSTRACT

Databases are powerful tools to simplify managing and accessing information, which have been proved to be fundamental capabilities in the Data Science Age. Currently, databases are being widely implemented in many different applications and fields. In this work, we highlight the benefits that publicly available databases of professional women working in Science, Technology, Engineering and Mathematics (STEM) fields can provide to overcome the problem of lack of gender diversity and equity in them. Some examples of public databases in Spain are provided. Special focus is given to the Girls4STEM project database, which promotes gender perspective innovation from a Higher Education Institution.

KEYWORDS

databases, STEM, gender diversity, gender equity, sustainability

ACM Reference Format:

Carmen Botella-Mascarell, Emilia López-Iñesta, Silvia Rueda, Anabel Forte, Esther de Ves, and Xaro Benavent. 2021. Using databases to improve the visibility of women’s contributions in STEM fields. In *8th ACM Celebration of Women in Computing: womENCourage ’21*.

1 INTRODUCTION

Sustainability or sustainable development is traditionally defined as “the use of the environment and resources to meet the needs of the present without compromising the ability of future generations to meet their own needs” [2], but during the last decades, the notion of sustainability has gone beyond environmental considerations, including social and economic dimensions [5]. Currently, there is an overlap between the different dimensions of sustainability. In fact, it is not possible to have sustainability without social sustainability.

In this sense, gender equity and diversity are cornerstone in the promotion of social sustainability from the perspective of education, towards creating awareness of gender stereotypes and promote long-term changes in attitudes in school-age children and their communities. According to [7], gender-based attitudes are socially constructed and learned through a wide range of educational

institutions and environments: formal (schools and universities), non-formal (families and workplaces) and informal (social relationships, and recreational activities). This is closely related to the creation of sustainable communities without gender-based disparities and Sustainable Development Goals (SDGs) achievement. In fact, 104 of the 246 indicators distributed across 9 of the 17 SDGs are identified as gender-related in the 2030 Agenda for Sustainable Development. In this work, we discuss the role of databases as a fundamental tool towards promoting gender diversity and equity in the Science, Technology, Engineering and Mathematics (STEM) fields. Lack of gender diversity and equity in STEM is becoming a pressing issue [3, 8]. Besides the real possibility of becoming a major employment problem for women in the upcoming years, the impact of disregarding the gender dimension in research and development is already creating discriminating situations in the current Data Science age. In section 2, we review the link between higher education institutions and gender perspective based innovation, and their final impact in society. In section 3, we motivate the positive role of publicly available databases of professional women in STEM and provide some examples from Spain. Finally, conclusions are drawn in section 4.

2 GENDER PERSPECTIVE INNOVATION AND UNIVERSITY INSTITUTIONS ROLE

University institutions with their different missions of teaching, research and transfer contribute to the social fabric of the community and its immediate environment. Thus, innovating from the teaching and research mission at the University by integrating the gender perspective to promote scientific and technological vocations of future generations can and should be a task that strengthens the relationship with local and national companies, as well as other institutions in order to bring improvements that result in social welfare.

Actually, these interactions are supported by the well-known triple helix model of University-Industry-Government Relations [4]. The evolution of this model (e.g., quadruple and quintuple helix models) is based on the assumption that knowledge and innovation, have the potential to educate, and integrate future societies [6]. In that respect, Universities can have a leading role when dealing

Table 1: Examples of databases, Spain

url	main features/objective
1. https://cientificas.amit-es.org/	PhD required. Mass media
2. http://www.sonpioneras.es/pioneras-lideres/	Knowledge transfer
3. https://agendadexpertes.es/	Mass media
4. http://girls4stem.uv.es/#/expertas#expertsCards	Promote STEM vocations

with the transition to the Data Science Age [10] working for the accomplishment of SDGs. From this perspective, Universities should also be regarded as an important actor towards reversing the gender inequity persisting in STEM fields [8].

3 USING DATABASES TO ENHANCE GENDER DIVERSITY AND EQUITY IN STEM FIELDS

The gender gap in STEM careers is a persistent problem [9], despite the recent efforts held by many initiatives. When searching for the reasons behind this trend, lack of role models and poor visibility of women's contributions are usually highlighted [3, 8]. One tool that can boost the visibility of STEM professional women (or academics), is to build and maintain databases that could help locating and giving them the opportunity to contribute when needed in different roles (contributions in mass media, knowledge transfer, etc.). In this section, we provide some examples of publicly available databases in Spain, each of them with different objectives or features. Table 1 summarizes this information.

Database 1 is provided by the Association of Women Researchers & Technologist (AMIT). This database focuses on giving visibility to women as experts in their respective fields of research. A requirement to appear in this database is owning a PhD degree. The aim is to ensure that events dedicated to the science dissemination and research are of equal standing. This database currently allocates 3385 researchers, and it allows to establish filters by research area, field or keywords. It has an advanced search feature to help browsing the database. **Database 2** is provided by the #SonPioneras project, and it is a platform open to all female academics who want to show their profile as leaders, promoters or participants of activities related to knowledge transfer in its broadest sense either through contracts with companies or institutions, patents, creation of spinoffs, as well as in projects of any nature that are helping to promote changes and innovations in our society today. This database allows searching by research area or by researcher name. **Database 3** is supported by the "Unió de periodistes valencians" (a journalist association) and the five public universities from the Valencian Region. Its main objective is to provide a database of women experts for the mass media. This database currently allocates 555 professional women and it is not only limited to STEM profiles.

Database 4 is maintained by the Girls4STEM project [1], where the objective is to promote STEM vocations, specially among girls. The project, led by the School of Engineering of the University of Valencia (www.uv.es/etse), is based on dissemination activities that are organized to connect students, their families and teachers, to STEM female experts in order to deconstruct gender stereotypes and foster interest in STEM disciplines. This database includes experts from all STEM disciplines, with very diverse professional

profiles and academic degrees. It is important to highlight that the information provided to the general public is different from the one maintained at the administrator level, where private data is included to contact the experts when needed.

4 CONCLUSION

Information and communication technologies in general, and computer science in particular, have a leading role towards addressing the upcoming challenges of our society. Evidence shows that women are either not accessing Science, Technology, Engineering and Mathematics (STEM) fields, or leaving them due to adverse working conditions. In the current Data Science Age, this trend will impose a huge penalty for them both in terms of employment and quality of life. In this work, the role of publicly available databases to enhance the visibility of women's contributions in STEM files has been introduced and some examples from Spain have been provided. Special focus is given to the Girls4STEM database, which seeks to promote STEM vocations, specially among girls.

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