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Key characteristics of academics promoting Sustainable Human Development within engineering studies

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ABSTRACT

In the last decade, a growing number of technical universities and engineering faculties have been promoting various initiatives aimed at integrating sustainable development in their activities. Despite the fact that the commitment of the academic staff has been widely recognised to have a key role in university change processes towards sustainable development, few studies have specifically analysed the characteristics of academics engaged in such processes. The present study provides an analysis and a profile of a group of academics, participating in a training programme on sustainable human development, granted by a European fund. The methods employed include a semi-structured survey, focusing on the academic activities and social outreach of the participants, complemented by a bibliometric analysis of their scientific production. The findings show: 1) an interdisciplinary profile of the academics, 2) an integration of sustainable development principles in all academic activities and 3) a promotion of those principles outside the university. It is emphasised that the commitment of this type of academics can facilitate a cultural change in engineering education, as well as more holistic transformations of universities towards sustainable development. The paper concludes by providing recommendations for leaders and policy makers of higher education institutions on the implementation of appropriate policies and mechanisms to facilitate faculty engagement in sustainable development.

1. Introduction

Over the past few decades we have witnessed an increased political will in relation to Sustainable Development (SD), which has been identified as one of the greatest challenges that our societies are facing. This process of growing social recognition has guided the UN Millennium Project (UN Millennium Project, 2005) and the Post-2015 Development Agenda, leading to the final adoption of the Sustainable Development Goals (SDG) (United Nations, 2015).

Societal awareness of global challenges has increased tremendously in the last decade. This reflects wider societal debates that particularly concern higher education. The United Nations Decade of Education for Sustainable Development (DESD) 2005–2014 promoted the integration of the principles of Education for Sustainable Development (ESD) across all levels and aspects of education, with the goal of fostering a more sustainable society. Among the major achievements of the DESD we can highlight: i) a general reorientation of a number of education programmes, addressing and integrating sustainability issues at different levels; ii) an increasing convergence between sustainable development agendas and education agendas; and iii) the increase of important pedagogical innovations. Nonetheless, the final report indicates that more efforts are needed to further transform learning and training environments, especially by building the capacity of educators and trainers to properly integrate SD into their academic functions (UNESCO, 2014).

In response to this growing call, an increasing number of higher education institutions (HEI) have been engaged in incorporating SD into their systems (Lozano et al., 2015), reconsidering university

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policies (Wals, 2014), and the content of their curricula (Lozano and Lozano, 2014; von Blottnitz et al., 2015). Nevertheless, SD is not yet comprehensively integrated into higher education systems (Mulder et al., 2015) and the pace of change has been little and slow (Watson et al., 2013). Scientists and scholars have analysed and discussed the multiple barriers that hinder the consolidation of SD into higher education (Ferrer-Balas et al., 2008; Lozano, 2006; Velazquez et al., 2006). In a more recent study, Verhulst and Lambrechts (2014) associate these barriers with different factors, such as: i) the lack of awareness or interest academics, students and staff have concerning SD issues; ii) the structure of higher education, characterised to be conservative and disciplinary with strong resistance to change in the functions of education and research; and iii) the lack of resources and adequate institutional support.

Despite there being many examples of SD implementation throughout the higher education system, those efforts made in universities are generally compartmentalised (Lozano et al., 2015). Contextually, scientific literature highlights that the role of academic staff engaged in sustainability practices in the different functions of universities is essential in order to promote transformation at university level (Krizek et al., 2012; Lozano, 2006) and to better connect with the wider society (Ferrer-Balas et al., 2008). These academics, often heralded as 'sustainability champions' (Lozano, 2006) are generally not sufficiently supported nor incentivised by academic institutions (Hoover and Harder, 2014). For these reasons, reconsidering the role of academics engaged with SD as agents of change within university institutions and as interfacial connectors between universities and societal organisations is of primary importance to enhance university transformation (Hugé et al., 2018). Limited research is available on the research and academic profiles of academics integrating SD into their practice.

Bearing this context in mind, this article aims to provide evidence to answer the question: are there any common patterns in the academic profile of academics engaged in SD practices? The research is designed to answer this question through a mixed approach. On the one hand, through a semi-structured survey aimed at analysing academic aspects such as: teaching innovation, the relation between teaching and research, the integration of SDGs in teaching and research, social outreach and collaboration, etc. On the other hand, through a bibliometric analysis – to expand the research profile of academics engaged in sustainability.

To accomplish this task, data have been collected by distributing the survey to a group of academics involved, at different levels, in the training activities promoted in the framework of the European initiative "Global Dimension in Engineering Education", a collaborative project promoted by a consortium of technical universities and Non-Governmental Organisations (NGO), aimed at improving the competences of academics in Sustainable Human Development (SHD). The bibliometric analysis was carried out by using maps of science, and focused on the academics that answered the survey.

The rest of the paper is structured as follows. The second section contains scientific literature on academic staff engagement, specifically focusing on technical universities. The third section describes the GDEE initiative. The fourth section introduces the research methods. The fifth section describes the empirical results. The sixth section contains the discussion of the findings. Finally, the seventh section presents our conclusions and proposes recommendations.

2. Academic staff engagement in technical universities

Technical faculties and universities are particularly susceptible to barriers to change concerning SD. The main reason is that engineering education is primarily focused on technical aspects and, traditionally, there have not been many opportunities to develop broader knowledge and skills to respond to the complexity of global problems related to SD, as reported by Crofton (2000). Despite the calls for a reform of engineering curricula to integrate SD (Watson et al., 2013), and the need to restructure teaching approaches (Leal Filho and Nesbit, 2016), engineering methods and tools are still characterised by a strong practical orientation and mostly focus on finding and implementing solutions that work with certainty and predictability (Halbe et al., 2015). Responses to calls for curricula reform in engineering are, in general, relatively limited (Fenner et al., 2005; Lozano and Lozano, 2014; von Blottnitz et al., 2015). It is worth highlighting specific approaches and strategies aimed at integrating SD principles into technical universities (Egelund Holgaard et al., 2016; Lozano et al., 2015; Rose et al., 2015). In addition, complementary perspectives have focused on promoting the convergence between engineering and development studies (Boni and Pérez-Foguet, 2008; Pérez-Foguet et al., 2005), following the theoretical framework of Sustainable Human Development (SHD) (Absell, 2015). However, significant updates of engineering curricula seem to be relatively limited (Davidson et al., 2010), and much of the strategies adopted by technical universities have primarily focused on developing individual courses on SD (von Blottnitz et al., 2015).

Various recommendations addressing academics have been proposed to trigger cultural change in an environment characterised by dominant structures based on technical paradigms and strong disciplinarity (Egelund Holgaard et al., 2016; Mulder et al., 2012; Sammalisto et al., 2015). Lozano (2006) recommends "detecting, engaging and empowering the individuals who are already convinced with the idea, making them SD champions to help them achieve a multiplier effect throughout the entire organisation". Nonetheless, it is widely recognised that HEI often do not provide adequate institutional support and incentives for those academics willing to integrate SD into their teaching and research activities (Hoover and Harder, 2014), and the majority of endeavours are primarily made for the personal satisfaction of overcommitted academics, and most go unrewarded (Krizek et al., 2012). In the case of engineering, activities not falling within the disciplinary context of the core technical content are often not fully recognised during the evaluation of teaching and research merits. The literature analysing the education of engineers for SD and its relevant challenges, emphasises the need for complementary approaches to foster changes in engineering curricula (Krogh Hansen et al., 2014; Mulder et al., 2012). Specifically, the scholars point out that top-down institutional support has to be complemented with bottom up initiatives, aimed at further engaging motivated academics. It is vital, thus, to effectively tackle this shortcoming, identifying the drivers to foster the empowerment and the active engagement of academics in sustainability education and research.

Ferrer-Balas et al. (2008), in a work comparing sustainability transformation across seven scientific-based and technical universities worldwide, discuss barriers as well as internal and external drivers of university transformation towards SD. The research conclusions point out that, on the one hand, among the various factors that affect transformation towards SD, the main barrier to overcome is "the lack of an incentive structure for promoting changes at the individual level". On the other hand, the authors highlight the main driver affecting transformation as the existence of "connectors" with society. Specifically, connectors are identified with networks of people engaging in interactions between departments or with non-academic societal entities. These connectors can be interdisciplinary research groups as well as professors or groups engaged with societal challenges. Language, practices, approaches and incentives adopted by connectors can influence diverse actors of universities, encouraging the creation of a critical mass of professionals engaged with SD (Ferrer-Balas et al., 2010).