

# La Dimensión Global en los estudios tecnológicos: promoviendo el aprendizaje global en las universidades españolas

## Global Dimension in Engineering Education: promoting global learning in Spanish universities

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**Resumen:** La iniciativa 'Dimensión Global en los Estudios Tecnológicos' (GDEE) es una red que pretende mejorar el conocimiento, la comprensión crítica y los valores actitudinales de los estudiantes y de los postgraduados de las universidades científico-tecnológicas en relación al Desarrollo Humano Sostenible (DHS). El objetivo es promover la integración del DHS como tema transversal en el currículo, mediante la mejora de las competencias de los profesores y a través de su participación y la de los estudiantes en iniciativas relacionadas con el DHS. La iniciativa empezó como un proyecto de colaboración entre un consorcio de universidades europeas y ONGs financiado por EuropeAid. Esta contribución presenta y discute la experiencia europea GDEE, profundizando las barreras y oportunidades encontradas, centrándose especialmente en la replicabilidad potencial de esta iniciativa. Estos resultados se complementan con la caracterización y el análisis comparativo del perfil académico de una comunidad de profesores implicados en actividades promovidas por GDEE.

**Abstract:** The 'Global Dimension in Engineering Education' (GDEE) initiative is a network that aims to increase the awareness, critical understanding and attitudinal values of undergraduates and postgraduates students in technical universities related to Sustainable Human Development (SHD). The goal of this initiative is integrating SHD as a cross-cutting issue in teaching activities by improving the competences of academics

and through engaging both staff and students in initiatives related to SHD. It started as a collaborative project between a consortium of European Universities and Non-Government Organisations funded by EuropeAid. This contribution presents and discusses the GDEE European experience, deepening about barriers and opportunities founded during project implementation, especially focusing on the potential replicability of this initiative. These findings are complemented with a characterisation and comparative analysis of the academic profile of the community of professors involved in GDEE activities.

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**Palabras clave:** Dimensión Global; Ingeniería; Desarrollo Humano Sostenible; Formación de formadores

**Keywords:** Global Dimension; Engineering; Sustainable Human Development; Training of trainers.

# 1. Introduction

Contemporary societies recognize Sustainable Development (SD) framework as the most appropriate way to address global challenges. The political impetus of the last decade towards the emergence of more equal and sustainable societies, has led to the adoption of historical agreements, such as the adoption of United Nations 2030 Agenda for Sustainable Development (United Nations, 2015), and Paris agreement on Climate Change (UNFCCC, 2015). In both cases, it has been recognised that global challenges will hit low-income country hardest, so that particular efforts should be made to provide effective responses to the needs of the most vulnerable communities.

Engineering is a field that is especially relevant to address SD complex and interrelated problems affecting socio-economic and environmental systems and is directly related to many of SDGs, as well as technology development and transfer, addressed to climate change mitigation. Consequently, it is especially relevant providing engineers with skills and competences enabling them to exercise their profession prepared for the new challenges. The effects of this increasingly global profession, alongside a growing awareness of unsustainable changes that have emerged at a global level over recent decades, should be appropriately reflected in engineering curriculum. Despite the need to better connect engineering studies to the new realities of SD and globalization, already identified and analysed years ago (Crofton 2000), few engineering schools have made major updates to courses and curricula (Davidson et al. 2010). Nonetheless, during the last decade, many technical universities have been reconsidering the nature and content of their curricula to ensure that the concept of SD is incorporated into professional education with different approaches (Pérez-Foguet et al. 2005; Boni & Pérez-Foguet 2008; Mulder et al. 2012; Lozano et al. 2014). Contextually, different approaches have been followed to reinforce the alignment between engineering and development studies (Boni & Pérez-Foguet 2008; Pérez-Foguet et al. 2005), in line with Sustainable Human Development (SHD) theoretical framework (Absell 2015; Otano Jiménez 2015).

Current trends show that engineering faculties and departments tend to protect 'core engineering' content from those that are still considered peripheral subjects (Bourn and Neal, 2008). Nevertheless, the active implication of academic staff has been indicated as a starting point to impulse transformative changes in curriculum innovation toward sustainable development (Barth & Rieckmann 2012; Lozano García et al. 2008; Cebrián et al. 2015). With the aim of fostering the active implication of faculty of technical and science based university towards SHD, in 2012, academics from different European technical universities and NGOs' practitioners came together in a collaborative consortium known as Global Dimension in Engineering Education (GDEE). The beginnings of this process were driven by the opportunity for funding support from Europaid (Non-State Actors and Local Authorities in Development: Raising public awareness of development issues and promoting development education in the European Union). The consortium comprised five technical universities and four NGOs from three EU countries: Spain, United Kingdom and Italy.

## **2. Fostering global learning in technical universities**

The paper is organized as follows. Section two presents the overall strategy and results of the GDEE initiative, deepening respectively: i) GDEE materials and courses; ii) the impact of GDEE academic training; and iii) the characterization of the scientific profile of GDEE community. Section three presents main conclusions.

### **2.1. The GDEE strategy**

The project started in 2012, with the aim of promoting the development of key capabilities and skills of relevant players in the HE system across the EU, notably academics and students of engineering degrees, in order to effectively mainstream SHD as cross-cutting issue in engineering education.

The proposed approach was to incorporate a Global Dimension (GD) as an integral part of engineering education. A GD is one that encourages students to think of themselves as global citizens and thus promote a sense of global social responsibility (Bourn & Neal 2008). The focus is on the incorporation of SHD in academic activities, specifically promoting the understanding of issues related to global development: extreme poverty, human rights, globalisation, equality issues and environmental challenges. This does not stand alone within engineering education as there are already relationships with other agendas, such as: sustainability science, humanitarian engineering and ethics. However, the benefits of including a global dimension is that it can help students make links to the real world, and enable engineers to play a role in poverty reduction, human rights issues, and conflict resolution. The composition of the consortium, comprising universities and NGOs, reflects the approach promoted with this initiative: fostering the cooperation between NGOs and academia as key factor in reinforcing the presence of SHD in formal teaching programs at all levels of engineering education.

The project strategy has been based on a holistic approach focused on three main areas:

1. Competences: enhancing the competences of academics and students with regards to their understanding of SHD issues and their capability to mainstream them in the academic curricula;
2. Connectivity: enhancing the capability of academic institutions to connect and share efforts within and across EU Member States as well as share and disseminate results and best practices regarding the integration of MDGs/SDGs into technology studies;
3. Collaboration: enhancing the ability to work with other stakeholders, notably Non-Governmental Organizations (NGOs) in order to advance a more practical dimension to the work carried out at academic levels.

According to this strategy, the project included different complementary activities aimed at up-skilling, motivating and engaging academics with development issues, as well as promoting SHD issues in engineering education. Specifically:

- Faculty training through a series of on-line training courses
- Production and promotion of a set of training materials addressed to academics as open educational resources (OER).
- Production and promotion of a set of contextual case studies written jointly by NGOs and academics to support teaching as OER.
- Creation of a European network of academics aimed at the integration of SHD into technology studies.
- Promotion of two editions of a "European award for best practices on the integration of SHD into technology education".
- Promotion of formal and informal activities involving students, academics and NGOs' members.
- Policy development actions.

Roots of the methodological approaches on which this initiative is based can be found in previous works of project partners. Specifically, it is worth highlighting the works of Boni Aristizábal and Pérez-Foguet (2006) and Oliete and Pérez-Foguet (2008) as examples of courses materials and contextual case studies specifically addressed to academics of technical universities that were promoted in Spain from 2004 to 2008 that have been taken into account in the project definition.

The project's main outcome, namely on-line courses and training materials, will be presented extensively in next *section*. Other important outcomes that characterised the project strategy, namely European Awards and the European Network of academics, have been outlined elsewhere (Trimingham et al. n.d.).

### **2.1.1. GDEE materials and courses**

In order to increase competencies among academics to engage with the global development agenda, training materials alongside nine courses were developed to train academics of technical or science-based course throughout Europe. A set of open source on-line courses were offered with the aim to increase the competencies and abilities of academic staff to integrate development-related issues in their teaching and research activities. Courses' pedagogical approach has been extensively described elsewhere (Trimingham et al. n.d.). It is worth highlighting, as a specific contribution of the project, that both academics and practitioners members of the consortium purposefully participated to materials and courses' design and implementation, contributing in curriculum development and courses' structure. Courses were divided into three thematic blocks, aimed at covering the specific needs of academic staff, depending on

their grade of involvement and interest in development issues. Each block comprised of three short courses (see Table 1).

<p>Block A – <b>The Global Engineer</b></p>	<p>Addressed to those academics that want to introduce cross-cutting issues in their activities; i.e., including a session related to SHD within, typically, a BSc course. Course A.1: Making the case for a critical global engineer Course A.2: Key elements for addressing the global dimension of engineering Course A.3: The Global Engineer in Sustainable Human Development</p>
<p>Block B - <b>Supervising BS/MS thesis with fieldwork</b></p>	<p>Addressed to those academics who want to advice students involved in field-work or other extension activities during BSc projects or MSc thesis. Course B.4: Supervising Engineering Students Course B.5: Knowing the context and partners Course B.6: Knowing International Cooperation</p>
<p>Block C - <b>Integrating GDE into teaching and research</b></p>	<p>Addressed to those academics (or professionals) who want to design a course relating Technology and SHD, from their own technical expertise. Course C.7: Integrating GDE into the academic Course C.8: Integrating GDE into Teaching: Theory and Practice Course C.9: Integrating GDE into Research</p>

**Table 1.** Course outline

With the aim to support the implementation of each course, a set of training materials has been developed by selected European experts in this field. According to the networking strategy of the project, active participation of academics of non-partner European universities was strongly promoted. More than 40 academics from sixteen European universities and twelve experts in the field of development (from NGOs, development training centres, and engineering organizations, among others) have closely collaborated in developing materials. Nine separate publications, one for each course, have been published and disseminated as Open Educational Resources. Each publication corresponds to one course and includes five chapters, written by different experts.

Alongside these courses, a set of contextual case studies, aimed at providing academic staff with specific materials to be used with students in the classroom, were developed. 28 case studies of real development projects from NGOs', project partners, and external organizations were selected according to their relevance. Then, each case study was assigned to a specific academic whom, in close coordination with the NGO providing data, developed the teaching material following a standardised template. More than 50 authors, mainly European, collaborated in this process. Each case study combines practical/contextual information on the specific project from which it is drawn (the context) with more academic-oriented content that is specifically designed to be used in class and during self-directed study (activities). Case studies, which are

published under the Creative Common License, can be adapted by each academic to suit their own teaching agenda.

The course structure consisted of nine on-line short courses equivalent to a total of 25 hours for each course (1ECTS), with duration of approximately 3 weeks. Each session included one reading lecture and a set of web resources (videos, reports, articles). In parallel, participants engaged with one another through collaborative tools and through discussion forums. Evaluation consisted of three types of assessment tools: i) assessment quizzes at the end of each session; ii) two academic activities, with the aim of putting in practice notions learnt through the sessions; iii) a final multiple-choice assessment.

Each course was overseen by an academic coordinator, responsible for the scientific and academic content of the materials developed and used for academic purposes. Moreover, each partner country selected course coordinators with expertise in a specific field and with knowledge of web-based teaching and tools. The open source nature of the online materials also allowed interested academics (and others) to 'dip in' without completing the courses.

Courses have been implemented through distance learning in the three partners' countries according to different strategies. In Spain, all courses have been offered through on-line learning via the virtual learning platform of the coordinator university. The UK adopted a different strategy, an NGO with previous experiences in faculty training lead courses activities with the support of the English university. In this case, instead of a university-based virtual platform, courses were run using free on-line tools for courses and social networks for groups' activities. In Italy, courses were run using the virtual platform of the Italian university. Unlike the other partners' countries, here a blended learning approach was adopted. Specifically, the first sessions of each course were offered presentially or via a videoconference with all registered members. Alongside this approach, courses were promoted for each thematic block, so that interested academics must register to the three courses of each block.

It is worth noting that special attention has been given to enhance replicability of this experience at different levels. The content and structure of each course, the contextual case studies, and supporting resources are available at project webpage ([www.gdee.eu](http://www.gdee.eu)) along with a number of other resources for academics. All academic resources have been published under a license Attribution-NonCommercial-ShareAlike of Creative Commons. Therefore they can be translated, improved and adapted to different contexts.

### **2.1.2. The characterization of the scientific profile of GDEE community**

Starting from the context described earlier, we analysed comparatively and characterise two groups of the GDEE community, with the aim to enhance understanding of the scientific profile of academics engaged in development issues and, consequently, foster

the replicability of the initiative in different contexts. The two groups analysed have different grades of expertise and involvement in SHD. From one side, 43 contributors, namely experts in SHD that have closely collaborated in developing training materials as well as in the delivery of on-line courses. From the other side, 47 participants, academics of engineering or science-based Spanish universities that completed one or more courses offered through the Spanish virtual platform.

The characterization of the scientific profile of GDEE community includes the following steps:

1. Selection and analysis of the research publications registered in Scopus database of the GDEE community.
2. Generation of an overlaid journal map based on data download from Scopus
3. Operationalization of a disciplinary diversity index.

After comparing the two main scientific databases Web of Science (WoS) and Scopus, following Chadegani et al. (2013) we opted to use the latter as our principal data resource mainly because Scopus adapts better to the characteristics of GDEE community. In fact, among GDEE courses participants there are a number of young; professors and PhD students, and Scopus covers a superior number has a broader coverage of journals even if with lower impact. Thus, essential research quality indicators (such as volume, impact, h-index) have been analysed using Scopus database.

Bibliometric analysis can be greatly enriched with the help of appropriate visualisations. Science maps, for example, are suitable tools for this purpose. They are visual representations built on the overall science interrelationship based on journal articles (Leydesdorff et al. 2014; Porter & Rafols 2009), and help to visually identify major areas of science, their size, similarity and interconnectedness. Specifically, the use of science maps is particularly helpful since allows to analyse different aspects of disciplinarity such as: i) the variety of "disciplines"; ii) the balance, or distribution, of disciplines (expressed by the relative size of nodes in the map); and iii) the disparity, or degree of difference, between the disciplines (expressed by the distance between the nodes of the map) (Porter & Rafols 2009).

Given the purposes of this study, we opted for a base map tool called Overlay.exe (Leydesdorff et al. 2014), a global map of science that can be interactively overlaid with journal distributions in sets downloaded from Scopus. Base maps can be used as a basic framework on which the journal distribution of a set of documents downloaded from Scopus can be projected. Subsequently, it is possible assessing the portfolio of documents in terms of the spread across journal and journal categories.

Furthermore, base maps can be used as a distance maps for measuring interdisciplinarity in term of journal composition. Simple to more complex indicators have been developed for the purpose of assessing interdisciplinarity of researchers. For the purpose of this research we opted for the use of Rao-Stirling index. Unlike other

indexes commonly used to assess interdisciplinarity, such as Shannon or Herfindahl, Rao-Stirling accounts not only for the variety but also for the disparity, namely the ecological distance among different subsets of journals (Leydesdorff & Rafols 2011; Porter & Rafols 2009).

### **2.1.3. Results**

#### ***Impact of GDEE academic training***

The GDEE courses ran from March 2014 to May 2015. Overall, 295 people enrolled to one or more courses for a total of 885 enrolments; with a median average of 98 participants per course. The distribution of enrolments in each of the three training centres is respectively: 71% Spain, 13 % UK, 16% Italy. Enrolled academics came from more than 50 European universities. The majority of participants (77%) are linked to a University, with 226 participants. They are in the majority professors and researchers (63%) and PhD students (26%). Among participants linked to university, females appear to be more interested, representing the 58%. NGO personnel represent the second largest group, at 18%. But also other categories (public administration, consultancy firms, etc.) showed an interest in the GDEE training initiative.

The completion rate can be defined as the percentage of enrolled participants who satisfied courses' criteria in order to earn a certificate. As reported in Table 2, completion rates of GDEE courses vary across different courses and thematic blocks. Overall, the highest rates of completions were registered during the introductory (A1, A2) and the mid-level blocks. The trend indicates a decrease within the first thematic block, then a slight increase for courses B4 and B5, then a clear decrease for the last thematic block.

SPAIN	Introductory Block			Mid-Level Block			Advanced Block		
	A1	A2	A3	B4	B5	B6	C7	C8	C9
Enrolments	65	67	73	60	63	74	66	73	84
Completions	26	25	21	16	13	13	11	13	15
Rate	40,00%	37,31%	28,77%	26,67%	20,63%	17,57%	16,67%	17,81%	17,86%

UK	A1	A2	A3	B4	B5	B6	C7	C8	C9
	Enrolments	29	25	24	10	14	11	6	(offered by Spain)
Completions	6	5	5	3	7	1	2		
Rate	20,69%	20,00%	20,83%	30,00%	50,00%	9,09%	33,33%		

ITALY	A1	A2	A3	B4	B5	B6	C7	C8	C9
	Enrolments	23	23	23	14	14	14	10	10
Completions	9	7	3	6	7	3	3	2	2
Rate	39,13%	30,43%	13,04%	42,86%	50,00%	21,43%	30,00%	20,00%	20,00%

TOTAL	Introductory Block			Mid-Level Block			Advanced Block		
	A1	A2	A3	B4	B5	B6	C7	C8	C9
Total									
Enrolments	117	115	120	84	91	99	82	83	94
Completions	41	37	29	25	27	17	16	15	17
Rate	35,04%	32,17%	24,17%	29,76%	29,67%	17,17%	19,51%	18,07%	18,09%

**Table 2.** Completion rates for online GDEE courses (totals)

According to the answers of anonymous surveys launched at the end of each GDEE course the training initiative had a positive impact on participants. Specifically, a very high percentage of participants (77% to 100%) agree that, as a result of taking a course, their interests in cross cutting issues (such as Millennium Development Goals, Human Development, extreme poverty, climate change, etc.) have increased. Moreover, a high percentage of participants (69% to 100%) agree that courses were useful for integrating crosscutting issues in teaching activities. Coherently, introductory courses, which dealt with topics in a more theoretical way, are perceived as less useful for integrating crosscutting issues.

Remarkably, GDEE completion rates are higher than other free on-line courses. Research on MOOCs shows that the majority of courses have completion rates of less than 10%, with a median average of 6.5% (Jordan 2014). According to Table 3, the GDEE courses showed completion rates between 13% and 40%, a remarkable result considering the limited availability of faculty to invest in training activities. Furthermore, courses had to be scheduled with a very short break between courses, in order to meet the project timelines. This overload, in combination with demanding development training, might have affected participants' motivation to complete all course activities.

Noticeably, the number of enrolments and completions is significantly different among the three partners' countries, nevertheless, similar to the relative institutional presence of universities in the project. This is qualitatively related with the relative

weight of partners within each of the engineering education sectors of the respective countries. In fact, in Spain the consortium includes academics from the three major polytechnic universities; whereas only one partner institution is included from the UK and Italy).

However, the different impact of courses may point out at differences in the implementation strategy followed in the different countries rather than problems with the dissemination strategy or lack of interest within academic sector. The positive impact of the courses on participants seems to confirm this assumption. In addition, a different degree of permeability of the concept of Global Dimension may have influenced the academic public's interest to training initiative. In this sense, in Spain this concept represented a novelty, while in UK different initiatives have been implemented under this concept in recent years.

### ***Scientific profile of GDEE community***

Following the methodology outlined earlier, the results of a comparative analysis and characterisation of a community of professors involved in GDEE activities is outlined in this section. Due to the high number of enrolments and completions in courses offered through the Spanish platform, the analysis especially focuses on Spanish faculty.

After performing author search in Scopus database for each member of the groups of contributors and participants, for a total of 90 entries. We found out that, roughly, only 60% of the members of GDEE community have a Scopus ID, for different reasons. Among contributors, mainly due to a number of NGO practitioners and other experts that do not have research publications. Instead, among courses participants, we found, surprisingly, a significant number of professors without Scopus ID as well as few practitioners and PhD students. Subsequently, we examined the scientific literature of all the members of the GDEE community with Scopus ID (respectively 31 contributors and 22 participants).

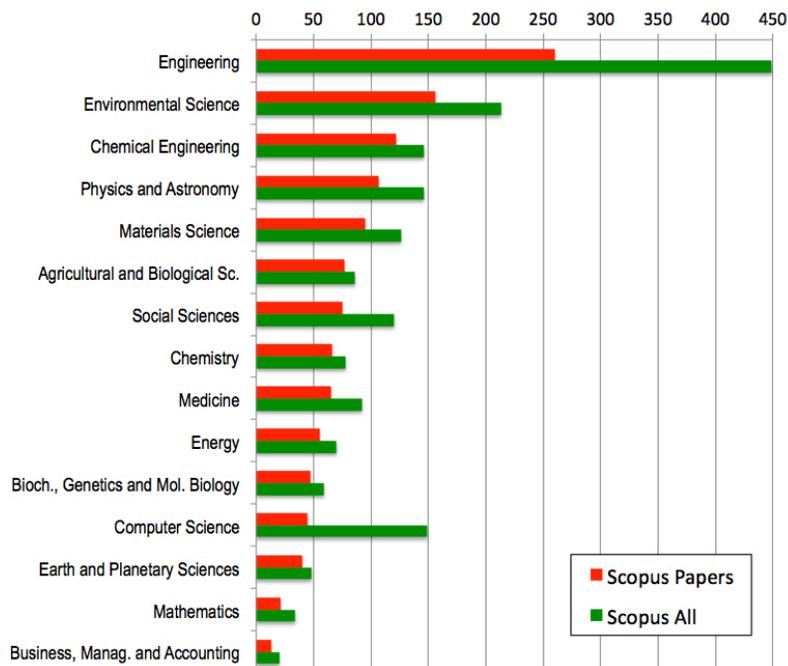
Table 3 summarizes overall results of the analysis of the two groups. It includes, from left to right, in the first line, the number of people with or without Scopus ID, the number of papers (Np), the number of total contributions (Nt) and the percentages of them classified in Scopus Engineering subject; and in the second line, the total number of hits in different categories (Ncat), the ratio of Ncat over number of papers, the percentage of hits in Engineering, the number of hits of total contributions (Ntca), ratio of Ntca over total number of contributions, and ratio of them in Engineering subject.

It is interesting to highlight some differences between GDEE contributors and participants. First of all, contributors have a higher number of Scopus ID than participants. However, participants with Scopus ID are scientifically more productive, almost 21% more papers/person. Secondly, contributors' research publications (including both articles and total contributions), are more focused in the category of Engineering, than those of participants, more than 20% in both. Finally, contributor's articles are more interdisciplinary in nature, counting in average in 2,63 categories, versus 1,98 of participants and, equivalently, when considering total contributions.

	Scopus ID	No Sc. ID	Num papers	Num total	Eng/Np	Eng/Nt
Contributors	31	12	220	352	60%	64%
Participants	22	25	362	536	36%	42%
Total	53	37	582	888	45%	51%
	Num categ.	Ncat/Np	Eng/Ncat	Num t. cat.	Ntca/Nt	Eng/Ntca
Contributors	578	2,63	23%	891	2,53	25%
Participants	715	1,98	18%	1003	1,87	22%
Total	1293	2,22	20%	1894	2,13	24%

**Table 3.** Figures summarizing main characteristics of both groups analysed.

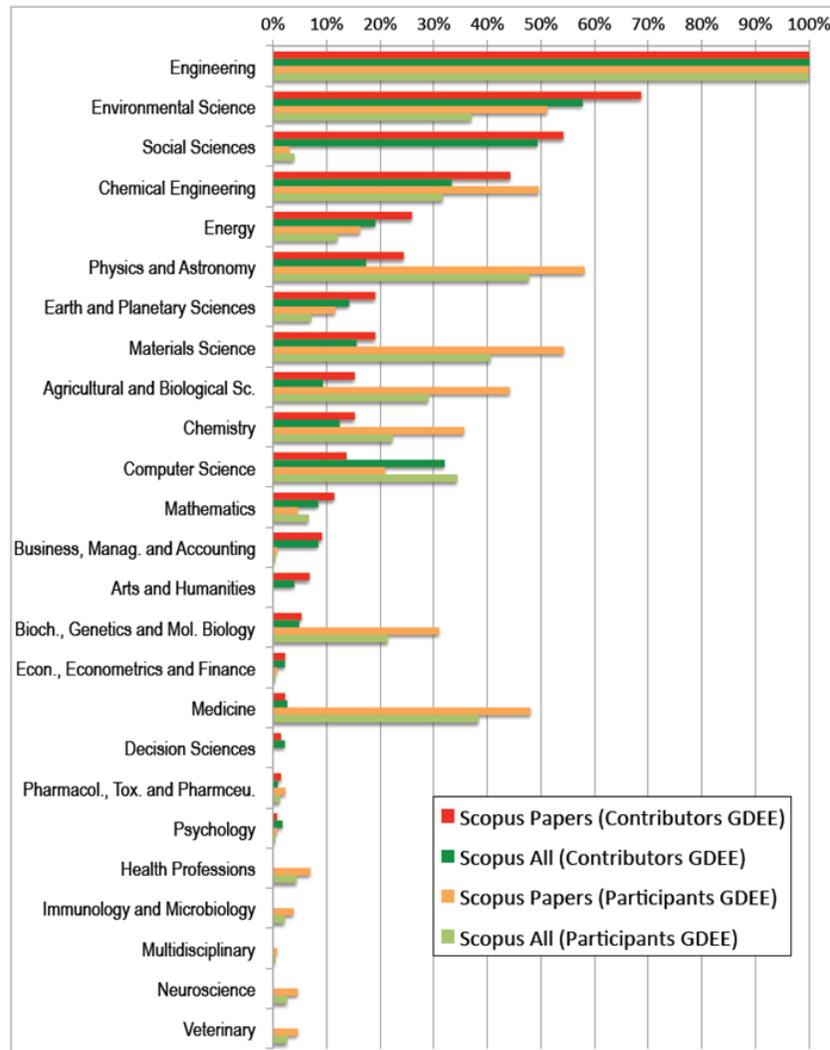
Figure 1 presents the total number of scientific contributions of the two groups, respectively articles and all contributions, using Scopus classification (only categories with more than 10 contributions are displayed). Coherently with the target of the project, the average profile of GDEE academic has the most relevant activity in the field of engineering, followed by Environmental Science and Chemical Engineering.



**Figure 1.** Number of papers and all contributions of GDEE community using Scopus classification.

Figure 2 presents the relative distribution of scientific publications using Scopus Subject Classification. Respectively, scientific articles and all contributions (comprising articles, book chapters, conference papers) of the two groups are displayed. Being engineering the predominant subject in both cases, it fixes the reference value for

100%. Then the order of subjects is fixed by decreasing the relative value of articles of contributors. It can be appreciated that the highest relevance of contributors is in Environmental Science and Social Sciences. Instead, the group of participants shows higher relevance in more categories (Physics and Astronomy, Materials Science, Agricultural and Biological Sciences, Medicine, etc.). Remarkably, the key areas that differentiate the two groups are Social Science and Medicine. In both categories, a particularly relevant research activity of one group is opposed to a significantly low activity of the other.



**Figure 2.** Relative distribution of articles and all contributions of GDEE community using Scopus classification.

These findings can be easily visualised in Figure 3 with the help of overlaid Science Maps. The figure shows the journals distribution of the scientific production of the two groups, highlighted onto a base map of global science (in light green), according to Scopus classification. At the top of the two maps are well visible the journals of Engineering fields (blue and yellow), predominant subject of research for both groups. Then, contributors and participants show journal distribution focused in opposed



NGOs has strongly contributed to the quality and novelty of training materials and courses.

The analysis presented specifically points out two key operational aspects for a successful implementation of a country or region based initiative similar to GDEE. Firstly, the identification and the active participation of a community of engaged contributors (authors, trainers) with a scientific background comprising engineering, environmental and social sciences. Secondly, the implementation of modular on-line courses jointly promoted and coordinated by partnerships of higher education institutions.

GDEE courses, as main output of the project, had a very positive impact on participants and special attention has been given to the replicability of the training initiative in other contexts. Spanish academics have shown especial interests in GDEE training courses and different initiatives, based on this project, have been promoted at local level in Spain. Despite very positive assessment from participants and surprisingly high completion rate, some critical considerations are needed. On the one hand, it should have been taken into account, to a greater extent, the limited amount of time of academics for activities of training and capability development. In fact, the volume of materials and the general pace of the courses were perceived as burdensome from participants. On the other hand, the decision of using existing (and separate) national structures and platforms may have limited European visibility of the project.

The comparative analysis and characterization of the scientific production of a reduced community of professors involved in GDEE training activities highlights important issues. First of all, Spanish participants trained in SHD are, in the majority, university professors with scientific production specifically focused in engineering-related disciplines. Notwithstanding, their research extends to other disciplines, especially in the fields of Medicine and Biological Science. Compared with the group of contributors, participants show the same degree of interdisciplinary research. The main difference between the two groups is whereas contributors have particularly relevant research activity in Social Science; participants are particularly actives in Medicine-related disciplines. It can be argued that faculty, including those with consolidated research trajectory and high degree of interdisciplinary research, are looking for a wider perspective and understanding of global challenges relevant to SHD, and their relations with the field of engineering.

This reflects wider societal debates that concern particularly higher education. Societal awareness on global challenges has tremendously increased in the last decade. A number of academics recognise that there is a variety of global challenges that need appropriate engineering solutions that current engineering formal training could hardly provide. The contribution of the GDEE initiative is specifically addressed at fostering the engagement of academic providing them with conceptual and practical instruments to integrate SHD in their teaching and academic activities.

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