

## International mentoring as a new educational approach to alleviate brain drain, empower young talent, and internationalize higher education

María Soriano-Carot, Rosa Bretón-Romero, Joaquín López-Herraiz, Rocío López-Diego, Abel Suárez-Fueyo, Gemma Pellissa Prades, Rosario Fernandez-Godino, Daniel Navarro-Gomez, Amaranta Saguar, David Nieto, Laura Sánchez-García, Borja Peropadre & Zafira Castano

**A novel program shows that young professionals working abroad can be instrumental in their home country's development.**

Higher education provides scientists, engineers, economists, and other professionals with the knowledge and skills they need to foster their nation's progress and economic growth. However, a nation's advancement is hindered when its highly qualified workers emigrate to seek a better political, social, economic, or cultural lifestyle. This phenomenon poses serious socioeconomic challenges, especially among developing countries; however, developed countries undergoing political or economic crises also face this loss. In recent years, countries such as Greece, Spain, Portugal, Romania, Bulgaria, South Africa, Iran, China, Mexico, India, and Jamaica have lost a significant proportion of university graduates to emigration. It is estimated that around 70% of these expatriated graduates will never return home<sup>1–3</sup>. It is important to develop policies and programs to alleviate the negative effects of this flight of human capital, or 'brain drain'.

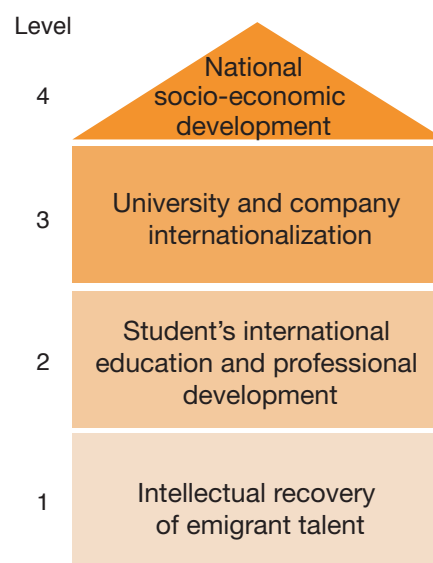
In 2015, the International Mentoring Foundation for the Advancement of Higher Education (IMFAHE; <http://www.imfahe.org>)

was founded upon a volunteer platform of highly qualified Spanish professionals living abroad. Its mission is to connect emigrant scientists and professionals with their home country in order to enhance the scientific, professional, and academic careers of future generations of young talent. IMFAHE was inspired by other mentoring programs, such as the Mentoring Circles Program at Brigham and Women's Hospital in Boston<sup>4</sup>, and the Harvard Graduate Women in Science and Engineering Mentoring Program (<http://projects.iq.harvard.edu/hgwise/home>), to develop the International Mentor Program (IMP). IMP's pilot program was carried out in Spain, where nearly 700,000 highly qualified professionals (1.5% of the total population) emigrated between 2008 and 2014 (refs. 5,6).

Here we describe the organization and practical implementation of this pioneering brain drain recovery and international mentoring program, which could be extended to other countries, along with its social impact on four specific levels (Fig. 1).

### Intellectual recovery of emigrant talent

In level 1, governments are aware that highly educated individuals are key players in their economic growth<sup>7,8</sup>, and accordingly they have introduced strategies and programs to reverse brain drain and/or retain skilled professionals at home. However, despite the presence of well-designed return-migration policies, a significant percentage of emigrant professionals do not plan to return home in the short or medium term<sup>9</sup>. Aiming to mitigate the negative effects of brain drain in Spain, which was heavily hit by the 2008



**Figure 1** Levels of impact for IMP on country of origin.

economic crisis, IMFAHE reached out to successfully established Spanish professionals in STEM, philology, and economics/entrepreneurship fields at top-tier academic institutions around the world (including Harvard University, Boston University, Massachusetts Institute of Technology, Stanford University, Yale University, Princeton University, and Karolinska Institutet) and first-class international companies (such as Amadeus IT Group and Santander Bank). These professionals enthusiastically embraced the creation of an organized and secure platform that would allow them to contribute to the educational, scientific, and economic development of their

María Soriano-Carot, Rosa Bretón-Romero, Joaquín López-Herraiz, Rocío López-Diego, Abel Suárez-Fueyo, Gemma Pellissa Prades, Rosario Fernandez-Godino, Daniel Navarro-Gomez, Amaranta Saguar, David Nieto, Laura Sánchez-García, Borja Peropadre & Zafira Castano are at the International Mentoring Foundation for the Advancement of Higher Education, Dedham, Massachusetts, USA. Correspondence should be addressed to Z.C. ([president@imfahe.org](mailto:president@imfahe.org)).

home country by acting as mentors to future generations of students.

Although all mentorship relationships are valuable and highly recommended<sup>10–12</sup>, having a mentor with international experience provides mentees with a broad, first-hand vision of the challenges and career opportunities that truly exist outside their immediate frontiers. In IMP's pilot program (academic year 2014–2015), 22 mentors took part, and this number increased to 86 mentors in 2015–2016. IMP mentors were selected on the basis of their curriculum vitae (CV), mentoring/teaching experience, and international expertise. At the beginning of the program, these mentors underwent a mandatory orientation (a standardized training event). Mentors were given access to tools and resources (information on grants and awards, sample CVs and cover letters, career development plans, etc.) through an online platform called Virtual Campus for use in their mentoring sessions. Virtual Campus is a Moodle platform and provided a safe environment where mentors and mentees were able to communicate and access information.

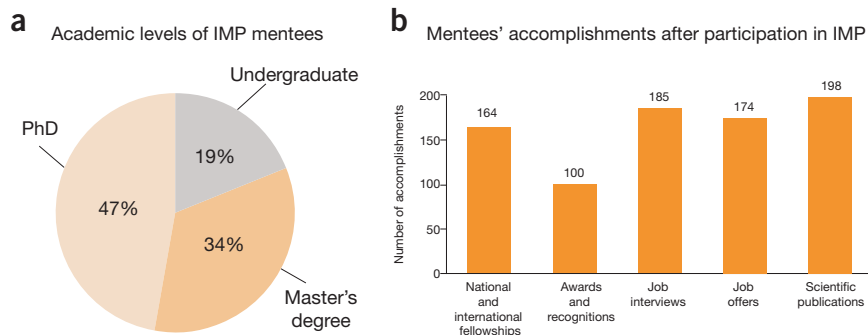
During the academic year, each mentor was matched with two to four mentees according to the mentees' career interests. They were required to hold at least five one-on-one video mentoring sessions with each mentee (referred to as eMentoring), as well as to maintain regular contact via e-mail.

Results from mentors' evaluations (65% mentor participation) showed that IMP helped them to increase their professional networks (up to 89 new connections in their home country, including vice chancellors, deans, professors, and students, and 69 new connections with other mentors involved in the program). Mentors stated that their participation in IMP allowed them to not only reconnect professionally with their home country, but also gain leadership competencies and communication skills that were very valuable for their personal career development. As a result, 98% of mentors were eager to return as IMP international mentors during the 2016–2017 academic year.

The overall level of mentor satisfaction and engagement with the program was very high, as reflected in the following testimonials:

"IMP allows me to give back to my own country, returning the help it invested in me years ago and which helped become who I am today." —Mentor, IMP 2014–2016, MD at Johns Hopkins University Hospital

"It is extremely rewarding to help the students and see how they achieve their goals." —Mentor, IMP 2014–2016, junior faculty/instructor at Harvard University



**Figure 2** Academic levels of mentees, and their number of accomplishments after participation in IMP. At the end of the academic year, IMP mentees were asked to fill out a self-evaluation. All surveys were anonymous and confidential to bolster the robustness of the results, and two independent external evaluators analyzed the results. (a) Academic levels of the IMP mentees who filled out the evaluation survey. (b) The sum of accomplishments reported by mentees after their participation in IMP ( $n = 161$  mentees).

### Improvement of students' international education and professional development

Students are the direct beneficiaries in IMP's second level of impact. IMP mentees are in a critical academic/professional stage of their lives, and their decision-making in this period influences the rest of their careers.

IMP's mentees (72 in 2014–2015, and 182 in 2015–2016) included students in the last year of their bachelor's-degree programs and graduate students enrolled in master's or PhD programs from 12 Spanish universities in an official consortium with IMFAHE. Selection criteria included their CV, their English language proficiency, and a personal statement describing their motivation for joining the program. IMP coordinators matched each mentee with a suitable mentor on the basis of their background and professional/academic interests. Before the mentoring sessions began, each mentee filled out a self-assessment survey to gain self-awareness regarding his or her baseline skills. This first step is essential in enabling the mentees to work with their mentors to establish relevant short-, medium-, and long-term objectives for the academic year, and to identify key milestones. The topics were addressed in each one-on-one eMentoring meeting, and were individualized and dependent upon each mentee's specific goals. These topics included—but were not limited to—getting a dream job, being admitted into a certain academic program, receiving input on scientific work, applying for fellowships, improving communication skills, and broadening professional networks. The assigned mentor worked with the mentee for the entire academic year by helping him or her delineate an appropriate path to success and the specific actions needed to meet the goals that had been set beforehand. In

addition to providing mentees with personalized scientific and professional guidance, IMP also supplied access to quality professional development resources by breaking down traditional geographical barriers. Through Virtual Campus, IMP created a solid, secure, real-time network that enabled mentees to connect with peers affiliated with other universities in their country, as well as with other mentors and relevant professional resources worldwide.

IMP is aware of the importance of exposing students in the early phases of their career development to up-to-date information about alternative career paths<sup>10</sup> outside of academia and industry, and it values the promotion of students' entrepreneurial vision. To address this and to help students to make informed professional decisions, in the 2015–2016 academic year IMP released 24 online seminars presented by renowned professionals who provided detailed descriptions of novel and high-demand career options in different specialties. The seminars were made available to all affiliated students at the universities participating in the program, and in less than 5 months the seminars were viewed 1,500 times. This highlights the relevance of and demand for this kind of real-world information and training in the early career phase.

As an additional professional and scientific internationalization opportunity, the IMFAHE-IMP sponsored 13 summer (6–8 weeks) training scholarships in 2015–2016 that were awarded on a competitive basis. These awards allowed selected IMP students to gain exposure to relevant career experiences, global research, and/or the labor market while living abroad. Students were trained under supervision at some of the top academic and professional centers in the world.

Results from mentees' evaluations at the end of the 2015–2016 academic year (161 of 182 mentees participated) are shown in **Figure 2**. Mentees credited IMP with helping them to secure a wide range of accomplishments and achievements, including 164 fellowships, 100 awards and recognitions, 198 scientific publications, 185 job interviews, and 177 job offers. These results demonstrate the positive short-term impact of the program on participants' career development. In coming years, polls will be conducted to evaluate the medium-term (3 years) and long-term (6 years) impact of the program on the scientific/professional career success of the participating mentees.

The following testimonials from students who participated in the program demonstrate its powerful and diverse contributions to their career-development needs:

"IMP has been an extraordinary opportunity to develop my professional career. Now, I am closer to achieving my goals. The professional network set up through IMP is a clear example of collaboration and growth within hubs of excellence." — Mentee, IMP 2015–2016

"At IMP I have been able to express my needs and hopes openly, in a relaxed environment free of academic pressure. I have overcome my fears and focused my PhD on a promising path with my mentor's support." — Mentee, IMP 2015–2016

### Promoting internationalization and building bridges of professional collaboration

In the third level, one important parameter used to measure the quality and excellence of universities and research institutions is their degree of internationalization<sup>13,14</sup>. In the current, globalized world, in order to promote knowledge flow and avoid being isolated and outdated, universities need to establish policies and strategies, and create activities and programs that foster collaboration and partnerships with other countries, institutions, and organizations. The physical mobility of researchers, students, and professors is the most visible factor that promotes internationalization. Programs such as Erasmus+, Socrates, and Fulbright, among others, play an important role in promoting the mobility of intellectual capital worldwide. However, universities are eager to participate in new programs that complement the existing ones, that are highly competitive and are focused on promoting physical mobility. During the IMP pilot program (academic year 2014–2015), five Spanish universities launched the program successfully, which led to a nationwide increase in demand. This ultimately gave rise to the program's escalation only a year later, with implementation at 12 universities across Spain (**Fig. 3**).

The vice chancellors of international relations from each university keenly supported the implementation of IMP at their institutions and, as experts in international matters, considered IMP an excellent program for the promotion of

institutional and university internationalization from different angles, such as by (i) accelerating the free flow of knowledge through exposure to new ideas and experiences from mentors; (ii) promoting the improvement of spoken English, which is considered the language of internationalization (eMentoring, scholarships, and most of the seminars are in English); (iii) building new bridges and collaborations among institutions from different countries; (iv) promoting excellence in global professional development through international scholarships; and (v) facilitating access to international talent, which favors the creation of new initiatives such as co-advisement on thesis dissertations.

### Improving socioeconomic development through global education

The final level of impact is the use of education to drive the development, progress, and growth of a country. To ensure sustainable socioeconomic welfare and progress, it is essential to empower youth with relevant knowledge and educational tools that optimize their productive capacity. Governments, aware that highly educated individuals are key players in economic growth<sup>7,8</sup>, have implemented strategies and programs such as diaspora policies to combat the loss of human potential.

Scientific diasporas have been defined as self-organized communities of expatriate scientists and engineers working to promote the development of their home country or region, mainly in science, technology, and education<sup>15</sup>. The global implementation of new information and communication technologies (ICTs), such as the internet, has made the expansion of these programs possible. ICTs have an advantage in that they do not require a large infrastructure investment to create international linkages and networking, and they theoretically have the potential to bring significant benefits to the countries where they are implemented, at relatively low cost. Examples of diaspora recovery programs are the South African Network of Skills Abroad (SANSA), Chinese Scholars Abroad (CHISA), the Colombian Network of Scientists and Research Professionals (Red Caldas), Arab Scientists and Technologists Abroad (ASTA), and the Silicon Valley Indian Professionals Association (SIPA). Nevertheless, some of these programs, while showing promise, failed to achieve the desired results in the end<sup>16</sup>.

IMP has proven to be a successful program (**Fig. 2**) that shares common basic objectives with diaspora programs, but also includes specific innovative features that have been critical to its success. IMP's structure/organization and model can proactively address the challenges that led some of the other programs to fail. First, IMP overcomes the problem of the



**Figure 3** Worldwide distribution of IMP mentors and participating universities (academic year 2015–2016). Red circles represent the mentors' locations worldwide. Blue circles represent the participating Spanish universities where mentees are enrolled, including the Universities of València (IMP coordinating partner/node in Spain), Oviedo, Miguel de Cervantes European University, La Laguna, Valladolid, Autonoma de Madrid, Carlos III of Madrid, La Rioja-Zaragoza-Lleida-Public University of Navarre (through Campus Iberus), and Politècnica de València.



heterogeneity and scattered locations of its members (in the case of IMP, its mentors) by grouping them in specialties (biomedicine, engineering, philology, and economics–entrepreneurship), and by creating an ‘anytime, anywhere’ coordinated platform (Virtual Campus) where they can easily and continuously interact, exchange knowledge, and organize action. Second, IMP addresses the possible lack of engagement of the participants by only accepting mentors who are highly skilled professionals who can completely empathize with the mentees’ circumstances, having personally experienced them some years before. Mentors must be willing and able to positively impact their mentees’ careers, and view the success of every young mentee as their own. Importantly, as previously mentioned, IMP overcomes the problem of a lack of reward for professionals abroad by providing a platform that offers them professional enrichment opportunities, thus allowing them to develop leadership and communication skills, broaden their national and international networks, and increase their opportunities for professional collaboration. Also, IMP guarantees its sustainability (one of the main reasons for the failure of some diaspora programs has been the lack of a long-term sustainability plan) through agreements with the participating universities (which pay a mentoring-service fee to be included in the program). Finally, IMP has proven its effectiveness and scalability, which are key features of its ongoing success and demand. IMP’s goal is to expand to several countries and become a program with a worldwide presence that creates new roads of knowledge and promotes global education.

### Conclusion

The solid higher education and global knowledge-exchange platform created by IMP at IMFAHE alleviates the negative impact of brain drain by turning it into an opportunity to vir-

tually retrieve the intellectual capital of those who left their native countries, to build collaborative bridges, to promote the innovative and entrepreneurial spirit of the native young talent (mentees), and to foster the internationalization of a country’s universities. Together, these initiatives provide IMP with the potential to become an effective and real driving force able to propel the socioeconomic development of a country. In the first annual IMP meeting held at València University in the summer of 2015, Ana Elorza, the Spanish embassy’s science coordinator and a representative of the Spanish Foundation for Science and Technology (FECYT) in the United States, stated, “IMP demonstrates that young professionals who are working abroad can be instrumental for their home country’s development.”

We hope that this description of the International Mentoring Program created by the founder of the IMFAHE non-profit foundation will assist other countries and institutions that are considering developing similar brain drain recovery programs and native young scientific talent promotion initiatives.

### ACKNOWLEDGMENTS

The authors thank all the volunteer mentors and mentees who participated in IMP since 2014; past (J. Carrera) and future (A. Fernández Álvarez and J. Sanz Fernández) program directors, coordinators, evaluators, and IMFAHE advisors (J. Kamens, F. Mayor Zaragoza and J. Garces Ferrer). We want to thank IMFAHE’s past and present collaborators: vice-deans for internationalization and their teams from all the universities involved in the past and future programs (Universities of València, Oviedo, Miguel de Cervantes European University, La Laguna, Valladolid, Universidad Autónoma de Madrid, Carlos III of Madrid, La Rioja-Zaragoza-Lleida-Public University of Navarre (through Campus Iberus), Politècnica de València, University of Navarre, University of the Basque Country, Politècnica de Madrid, Complutense de Madrid, University of Seville and University of Malaga), as well as FGV, ECUSA, FECYT, Santander Bank, CRUE, Fulbright Commission, Asti, and Fomento San Sebastian; also

all the international institutions and their principal investigators that welcomed our international interns (Massachusetts General Hospital, Brigham and Women’s Hospital, Harvard University, Massachusetts Institute of Technology, SUNY Downstate Medical Center, University of Austin at Texas, Schepens Eye Research Institute, Amadeus North America, Berkley University and Karolinska Institutet). All of our mentors who supported and guided us in this journey. Finally Ayana Henderson and Jessica Olive for kindly reviewing and editing the article.

### COMPETING FINANCIAL INTERESTS

The authors declare no competing financial interests.

1. Patrutiu-Baltes, L. The brain drain phenomenon within the European Union. *OneEurope* <http://one-europe.info/brain-drain-eu> (2014).
2. 10 countries facing the biggest brain drain. *OnlineUniversities.com* <http://www.onlineuniversities.com/blog/2011/07/10-countries-facing-the-biggest-brain-drain/> (2011).
3. Docquier, F. & Marfouk, A. *Brain Drain*. Report No. WPS3381 (World Bank, 2004).
4. Kuhn, C. & Castaño, Z. *Nat. Biotechnol.* **34**, 781–783 (2016).
5. Nelson, O. *The Social Effects of the Spanish Brain Drain* (Wharton/Univ. of Pennsylvania, 2015).
6. Arango, J. Spain: *New Emigration Policies Needed for an Emerging Diaspora* (Migration Policy Institute, 2016).
7. Hanushek, E.A. & Wobmann, L. *International Encyclopedia of Education* **2**, 245–252 (2010).
8. Neamtu, D.M. *Procedia Soc. Behav. Sci.* **180**, 413–420 (2015).
9. Papademetriou, D.G. *Rethinking Emigration: Turning Challenges into Opportunities* (Migration Policy Institute, 2015).
10. Kuhn, C. & Castaño, Z. *Nat. Biotechnol.* **34**, 781–783 (2016).
11. Cheema, T. & Kamens, J. *Nat. Biotechnol.* **33**, 1005–1006 (2015).
12. Fridkis-Hareli, M. *Nat. Biotechnol.* **29**, 287–288 (2011).
13. Brandenburg, U. & Federkeil, G. *How to Measure Internationality and Internationalisation of Higher Education Institutions: Indicators and Key Figures*. Working Paper No. 92 (Centre for Higher Education Development, 2007).
14. Green, M.F. *Measuring and Assessing Internationalization* (NAFSA Association of International Educators, 2012).
15. Séguin, B., Singer, P.A. & Daar, A.S. *Science* **312**, 1602–1603 (2006).
16. Solimano, A. *The International Mobility of Talent: Types, Causes, and Development Impact* (Oxford University Press, 2008).