

## **AC 2010-1317: DEVELOPING A SPANISH-SPEAKING COMMUNITY OF ENGINEERING EDUCATION RESEARCH SCHOLARS**

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# Developing a Spanish-speaking Community of Engineering Education Research Scholars

## Abstract

The calls to embrace a more rigorous approach to conduct engineering education research have received the attention of groups of scholars around the globe, driving the advancement of the field through the development of centers, departments and degree programs, prestigious publications, and conferences. However, the engineering education research movement has been more visible in the English-speaking world, where the majority of such initiatives have taken place. This reality represents an opportunity for other regions where engineering education research is not as prominent yet. Being the official language of 21 countries, and spoken by over 300 million people around the world, Spanish has the potential to become one of the *official languages* of engineering education research. This paper discusses the relevance of developing a Spanish-speaking community of engineering education research scholars by a) exploring the current state of engineering education as a research field in Spanish-speaking countries as reflected in emerging dissemination outlets; and b) describing recent efforts to develop global capacity and communities in engineering education research. The implications of developing and sustaining such community are discussed.

## Introduction

In the last decade, engineering education has gained significant recognition as a legitimate scholarly, research field. Proudly, “engineering education now enjoys a community of scholars and researchers, an emerging body of core knowledge, an identified research agenda and framework, recognized culture and vocabulary, avenues of dissemination [...] and is progressing steadily toward developing avenues to maintain standards and regulate quality.”<sup>1</sup> Acknowledging that this steady progress and the vitality of the discipline depends upon “a vibrant community of scholars and practitioners advancing the frontiers of knowledge through research and innovation,”<sup>2</sup> initiatives have been undertaken to develop networks and build engineering education research capability around the globe.

Examples of such initiatives include the development of research centers, departments and degree programs, and specialized conferences.<sup>3</sup> Other more decentralized ventures include special sessions at international conferences; for example the sessions on “Advancing the Global Capacity for Engineering Education Research,” a joint enterprise between the *European Journal of Engineering Education* and the *Journal of Engineering Education*;<sup>2</sup> and the series of workshops and seminars on “Building Capability and Communities in Engineering Education Research,” offered in partnership by the *Journal of Engineering Education*, the U.S. National Academy of Engineering's *Annals of Research in Engineering Education* and the U.S. National Science Foundation-supported initiative “Rigorous Research in Engineering Education.”<sup>4</sup>

While some of these initiatives have had the purpose of crossing national boundaries, there is a tacit, inexorable barrier that deters the development a truly global community of engineering education research scholars: the language. Given that English-speaking countries (i.e. the U.S.,

Australia, and the U.K.) have taken the lead in the advancement of engineering education research (EER), English has been adopted as the *lingua franca* of the field. While this approach facilitates international communication, it is of crucial importance that the engineering education research community embraces more actively other languages as *official languages* of the field, in order to a) disseminate results to local, national, and regional non-Anglophone audiences; and b) to become an even more inclusive community. Therefore, the purpose of this paper is to discuss the potential of Spanish to become one of the official languages of EER, and the relevance of developing a Spanish-speaking community of EER scholars.

## **The Spanish Language Today**

With about 400 million speakers, Spanish is the fourth most spoken language (after Chinese, English, and Hindi) in the world. As a first-language, Spanish ranks in world's second place (just after Chinese), being spoken in 44 countries by over 300 million speakers.<sup>5</sup> Some of the most important characteristics of Spanish as a linguistic system and communication vehicle include: 1) despite some geo- and sociolinguistic variations, Spanish is a linguistically homogeneous language whose risks of fragmentation are very low; 2) given the history, quality and richness of the Spanish and Hispano-American literature, Spanish is a first-class cultural language; 3) being the official and vehicular language of 21 countries, Spanish is an international language; 4) given that the majority of Spanish-speaking countries occupy contiguous territories, it is a geographically compact language; and 5) given the continuous growth of the Spanish-speaking population since the times of the colony, it is a language in expansion.<sup>6</sup>

The importance of the Spanish language in today's economy has been recently stressed by the project "The Economic Value of the Spanish Language: a multinational company."<sup>7</sup> The project brings together "economists, sociologists, statisticians, and language experts to quantify the intangible value of the Spanish language in the era of globalization."<sup>8</sup> Among other issues, the authors discuss the economic value that the Spanish language adds to the commercial and cultural exchange between Spain, the Americas, and the rest of the world; the extent to which the flows of goods, information, and Spanish-speaking people generates international collaboration in development, business, and policy; and the impact that the growing influence of the U.S. Hispanic population exerts in the social, economic, and political dynamic of the country.

## **The Need for *Stronger* Spanish-speaking Scientific Communities**

Despite of the economic and cultural importance of Spanish -or other languages-, the multiple ways of communication around scientific research are subject to the adoption of English as *lingua franca scientifica*, in order to facilitate the international dissemination of knowledge. This approach poses practical inconveniences to researchers of non-Anglophone countries; for instance, the time and effort invested in learning a foreign language; the experiencing of more difficulties to express their ideas than if it were done in their native language; and the experiencing of more difficulties to publish in Anglophone journals than the ones faced by native speakers, under the "publish *in English*, or perish" premise.<sup>9</sup> Beyond these –perhaps individual-often dismissed disadvantages, Hamel<sup>10</sup> persuasively states three "good reasons to maintain and promote a model of plurilingualism in science and higher education" for *super-central* language communities such as French, German, Spanish, Portuguese or Russian:

1. The reduction of diversity to one language in the production of models, topics and strategies of research might lead to a dangerous impoverishment of scientific creativity itself, since it destroys its constitutive, historical base of diversity in ways parallel to other ecological systems and fields.
2. The total imposition of English in the field of science, contrary to the idea of granting maximum flow and access to scientific communication, would reinforce the existing asymmetries of participation, particularly in terms of the production and circulation of other language communities' own scientific and technological production in the international sphere. If we consider the value of science and technology as a first order means of production, the withdrawal from science in their own language would probably affect the economic development of those countries or language communities that completely abandoned the use of their own languages in the field of science.
3. The growing monolingualism of the Anglo-Saxon scientific community and some of their satellites, as part of more general English monolingual practices and attitudes, poses problems not only to the international scientific community, but also in the fields of culture, international relations, intercultural communication and the preservation of peace.

The call to develop stronger Spanish-speaking scientific communities –and, inevitably, the entire infrastructure needed to support them such as journals, databases, conferences, opportunities for human capital mobility, etc. – is then not incompatible with the use of English or other languages for scientific communication, but a way to strengthen the production, dissemination, and – hopefully- use of scientific research around the globe.

### **Engineering Education Research in the Spanish-speaking World**

Quantifying the international presence of Hispanic EER is not a simple task, particularly because EER “is still in its infancy” in comparison to other more mature fields,<sup>2</sup> and therefore EER work has been and keeps being published not only in the few specialized venues for the field that currently exist, but in scholarly publications of related disciplines. However, it is not hard to imagine the order of magnitude of its share given that “by the end of the 20th century only 0.5% of the articles in natural sciences and 3.5 % in the social sciences and humanities in international scientific journals were published in Spanish.”<sup>10</sup>

A comprehensive –but not exhaustive- search through search engines (i.e. Google, and Google Scholar), relevant databases (i.e. Latindex, Redalyc, and Ulrich’s periodicals directory), and websites of international groups devoted to engineering education (i.e. Ibero-American Association of Engineering Schools, ASIBEI; International Federation Engineering Education Societies, IFEES; and Latin American and Caribbean Consortium of Engineering Institutions, LACCEI) yielded only a handful of “revistas” (journals) whose name and description seemed to “fit” in the category of periodicals that publish engineering education –albeit not necessarily rigorous- research in Spanish (see Table 1). While this number might seem small, it represents a positive reality, an opportunity for growth through the development of a stronger, more diverse community of engineering education research scholars.

Table 1. Periodicals that publish engineering education research in Spanish.

Name	Publisher	URL	ISSN
Revista de Educación en Ciencias e Ingeniería	Universidad Autónoma Metropolitana (México)	<a href="http://www.izt.uam.mx/contactos/">http://www.izt.uam.mx/contactos/</a>	0186-4084
Revista Educación en Ingeniería	Asociación Colombiana de Facultades de Ingeniería (Colombia)	<a href="http://www.acofi.edu.co/revista/revista.php">http://www.acofi.edu.co/revista/revista.php</a>	1900-8260
Revista Internacional de Educación en Ingeniería	AcademiaJournals - PHDTech	<a href="http://academiajournals.com/educacion.html">http://academiajournals.com/educacion.html</a>	1940-1116
Latin American and Caribbean Journal of Engineering Education	Latin American and Caribbean Consortium of Engineering Institutions	<a href="http://academic.uprm.edu/laccei/index.php/journal">http://academic.uprm.edu/laccei/index.php/journal</a>	1935-0295

### Towards a Spanish-speaking Engineering Education Research Community (of Practice)

Wenger's concept of *communities of practice* (groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly)<sup>11</sup> is being adopted by a growing number of engineering education researchers to frame processes of collective learning among groups with common interests.<sup>12-17</sup> According to Wenger, "not everything called a community is a community of practice;"<sup>11</sup> communities of practice have three crucial elements:

1. **The domain:** A community has an identity defined by a shared domain of interest. Membership therefore implies a commitment to the domain, and therefore a shared competence that distinguishes members from other people. They value their collective competence and learn from each other, even though few people outside the group may value or even recognize their expertise.
2. **The community:** In pursuing their interest in their domain, members engage in joint activities and discussions, help each other, and share information; building relationships that enable them to learn from each other.
3. **The practice** Members of a community of practice are practitioners. They develop a shared repertoire of resources: experiences, stories, tools, ways of addressing recurring problems—in short a shared practice. This takes time and sustained interaction.

The challenge then is not only to develop and/or concentrate a critical mass of Spanish-speaking engineering education researchers through diverse capacity building initiatives (e.g. certificates, seminars or workshops<sup>18</sup>), but to find ways to sustain dynamic and continuous interactions among them –to foster a community of practice–, and to promote the production and dissemination of scholarly work in Spanish. Anglophone initiatives such as CLEERhub.org (a *digital habitat* with the mission to address the continued need for developing engineering education researchers by leveraging the success of past NSF-funded programs<sup>19</sup>) might serve as a model to undertake this venture.

## Final Remarks

The apparent paradox of discussing the relevance of developing of a Spanish-speaking community of researchers in an Anglophone forum is resolved by the genuine intention of engaging a still emergent international community of scholars to –more actively– embrace a plurilingual approach, acknowledging that Spanish has not only the potential, but the need of becoming one of the official languages of engineering education research. As wisely stated by Rey-Rocha and Martín-Sempere, “although we cannot forget that Science is an eminently international activity, whose results have to be necessarily disseminated amongst the international community, we can neither miss the point of its national [local or regional] utility”<sup>20</sup> and need for dissemination.

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