Practice and Research in Engineering Education

Activities of the CESEI Technical Committee

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Abstract—**This paper shows the activities of the Technical Committee of the CESEI (Spanish Chapter of the IEEE Education Society). The CESEI is focused on the development of the education in engineering, mainly Electric and Computer Engineering, and the Technical Committee is devoted to contribute to its awareness and dissemination. As in other interdisciplinary fields, the engineering education field involves several sources of information and different stakeholders, each one with its own focus and purpose. As a result, sometimes it may be complex for practitioners and researchers to identify the more appropriate entities for their interests. The CESEI Technical Committee tries to solve this difficulty by providing updated information about the main publications (journals), events (conferences), organizations and other elements of interest.**

Keywords- e-learning publications, e-learning research

I. INTRODUCTION

Engineering education has risen as a global discipline during the last decades [1]. As a discipline it is usually considered multidisciplinary, involving particular topics of the engineering domains (electrical, computer, civil), social, legal and business issues, in addition to general education concerns. At this point, a common criticism to the consideration of engineering education as a discipline is that education researchers could better solve engineering education problems. Anyway, the teaching and learning of engineering has captured so much attention that it is a discipline on its own.

Nowadays there exists a large scientific community supporting the engineering education discipline. At engineering universities and schools it is very common to find researchers and research groups working on engineering education problems. Many engineering companies also have created groups to work on these topics in the context of life-long learning or career development programs. At a higher level, persons, groups and companies are joined into national and international associations whose main purpose is to work towards the development and empowering of this discipline. These organizations sponsor a large number of events and publish journals and books focused exclusively on engineering education problems. Some of these events and journals have been assessed as very relevant by main research indexes.

This interest on engineering education is also present in one of the most important engineering associations: the IEEE. The IEEE is the world's leading professional association for the advancement of technology. The IEEE name was originally an acronym for the Institute of Electrical and Electronics Engineers, Inc. Today, the organization's scope of interest has expanded into so many related fields, that it is simply referred to by the letters I-E-E-E (pronounced Eye-triple-E) [2]. IEEE includes many unique technical organizations, active in the areas or publications, conferences and building technical communities. Among these organizations, the Education Society (EdSoc) was created with the main aim of "*shall be scientific, literary, and educational in character. The Society shall strive for the advancement of the theory and practice of electrical and computer engineering and of the allied arts and sciences, and the maintenance of a high professional standing among its members and affiliates, all in consonance with the Constitution and Bylaws of the IEEE and with special attention to such aims within the field of interest of the Society*" [2]. His fields of interest are: "*Educational Methods, Educational Technology, Instructional Materials, History of Science and Technology, and Educational and Professional Development Programs within Electrical Engineering, Computer Engineering, and allied disciplines*" [2].

In 2004, it was created the Spanish Chapter of the Education Society of the IEEE (from now on CESEI). The CESEI has the same fields of interest and aims that the IEEE EdSoc has. Nevertheless, the CESEI is focused in Spain and in the Spanish tongue area [3]. Inside the CESEI several Technical Committees were created CESEI [4], one of them devoted to the dissemination and awareness of the engineering education field.

The final goal of the CESEI is to promote the development of this discipline supporting practitioners and researchers. To contribute to this goal the Technical Committee provides updated information about relevant conferences, journals and organizations. We consider this information very useful for professionals and researchers, because it is offered a clear picture of the main actors involved and the key sources of information. This paper is produced as a contribution to this effort, including an updated and complete compilation of

engineering education associations, conferences and journals at world and Spanish levels.

II. PRACTICE IN ENGINEERING EDUCATION

Typically, engineering education is organized along disciplinary lines. In the US and Western Europe one often finds engineering departments with titles such as Civil Engineering, Chemical Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, etc. The curriculum on these departments is usually made up by two years of education in fundamentals (mostly mathematics and physics), followed by disciplinary education within the confines of their specialized faculty and facilities. In some cases, students are offered with additional courses in social, business and legal sciences. These, however, are seldom integrated with the engineering curriculum in a manner that enhances the disciplinary knowledge or the practice of engineering techniques.

The specialized nature of engineering education runs contrary to the increasing need to prepare engineers for multidisciplinary and interdisciplinary work. In the real world, engineers often work in teams with other engineers and non-engineers with a wide range of specializations. The engineering process thus almost always transcends the particular engineering discipline and requires a much broader "holistic" view. Moreover, the engineering workplace has undergone significant changes in the last decades. Nowadays, almost all engineers depend on networking and computing tools. In this way, engineering education needs to extend beyond technical and scientific aspects, involving the master of issues such as:

- The ability to effectively communicate in written and oral forms.

- A set of business capabilities, practices and awareness. This includes understanding of marketing, economics and organizational management, their interplay among themselves and with the engineering process.

- An understanding for and work ethic for leadership in the workplace, individual and team contributions, sensitivity to customer needs, their incorporation into the engineering and engineering management process, and commitment to the concepts of total quality management.

- A sense of professional, ethical and legal responsibilities.

- An appreciation of the joy of learning and of the need for lifelong learning.

- An appreciation for intellectual breadth to be not only an engineering leader but a well versed and updated participant in societal activities. To reach this requires an appreciation for the humanities, arts, politics, law and business beyond that which is technically or scientifically targeted.

As the engineering curriculum is altered, it must be also addressed how we teach and learn it. In Europe, the Bologna Declaration signed in 1999 has accelerated these changes and new degrees have appeared. On the other hand, those changes have promoted a deeper interest on methodology, considering issues such as: how faculty interact with students, how students learn, and how emerging technologies are embedded into the educational environment making it more exciting and more effective.

III. RESEARCH IN ENGINEERING EDUCATION

Engineering education has become field of scholarly research in its own right. The past engineering education practices based on the transfer of knowledge, experiences and beliefs are no longer sufficient. Globally, engineering education is on the agenda for solving important issues for the future of engineering education, such as recruitment of students to engineering programs, the need for new competences and the ability to deal with new types of interdisciplinary and complex knowledge. More over, these changes have to be performed in accordance with sound research. This turn towards a more research-based approach is sustained by the growth in conferences, journals and publications dedicated to engineering education. The problem at this point is to get a clear picture of the main actors involved in this discipline: who are the more important associations? What are the best journals? Which is the most appropriate conference to publish a kind of research? These are some of the questions that users in the engineering education domain could be asking themselves. This section provides an excerpt of the main actors on this domain to solve them.

A. Engineering Education Associations

Associations focused on engineering education are spread worldwide. In this section we show the more important ones, taking into account their dimension, research relevance and international dimension. Table I includes key data together with the main conferences and journals supported by them. These conferences and journals are introduced in the following sections. Next it is provided a brief comment about the goals and scope of each of one of these associations:

- AACE is "*an international, not-for-profit, educational organization with the mission of advancing Information Technology in Education and E-Learning research, development, learning, and its practical application*".

- ACM SGICSE mission statement is "*to provide a forum for educators to discuss issues related to the development, implementation, and/or evaluation of computing programs, curricula, and courses, as well as syllabi, laboratories, and other elements of teaching and pedagogy*".

- AIED is "*an interdisciplinary community at the frontiers of the fields of computer science, education and psychology*". It promotes research and development of interactive and adaptive learning environments for learners of all ages, across all domains. Its goal is "*to advance knowledge and promote research and development in the field of artificial intelligence in Education*".

- APSCE objective is "*to promote the conduct and communication of scientific research related to all aspects of the use of computers in education, especially within the Asia-Pacific*".

- ASEE is "*a nonprofit organization of individuals and institutions committed to furthering education in engineering and engineering technology*".

- The IEEE CS is "*the world's leading organization of computing professionals and the largest of the 38 societies of the IEEE*". This society is dedicated "*to advancing the theory and application of computer and information-processing technology*".

- The IEEE ES fields of interest are "*the theory and practice of education and educational technology involved in the effective delivery of domain knowledge of all fields within the scope of interest of IEEE*".

- The IEEE LT is a technical committee of the IEEE CS. It has as a purpose "*to contribute to the field of advanced learning technologies*".

- The IFEES is and international society that groups to 48 member societies and companies. This association is working to establish effective engineering education processes of high quality around the world. Its final goal is "*to assure a global supply of well-prepared engineering graduates*".

- IGIP is working in cooperation with other associates dedicated to engineering education, such as SEFI and IFEES, "*to support the development of engineering education*". It has working groups in curriculum development, international aspects of engineering education, knowledge management and computer-aided technologies, languages and humanities in engineering education, mathematics and natural sciences in engineering education, people and technology, postgraduate education and qualifications framework, technical teacher training, women in technical careers, and working with projects.

- SEFI is the largest network of higher engineering institutions and of individuals involved in engineering Education in Europe. SEFI aims are "*to develop information about engineering education, to improve communication and exchange between professors, researchers and students and to promote cooperation between the various institutions concerned with engineering Education*". It maintains WGs on the following issues: Curriculum Development, Continuing Engineering Education, Mathematics, Information and Communication Technologies, Gender and Diversity, Physics and Engineering Education, Ethics in Engineering Education, and Engineering Education Research.

TABLE I. MAIN ENGINEERING EDUCATION ASSOCIATIONS

Acronym	Full Name	URL	Main Conferences	Main Journals
AACE	Association for the Advancement of Computing in Education	www.aace.org	ED-MEDIA	-
ACM SIGCSE	ACM Special Interest Group on Computer Science Education	www.sigcse.org	ACE, ICER, ITiCSE, ITS, SIGCSE	Transactions on Computing Education Inroads – SIGCSE Bulletin
AIED	International Society for Artificial Intelligence in Education	ihelp.usask.ca/iaied/ijaied/aiedsoc.html	AIED, ITS	International Journal of Artificial Intelligence in Education
APSCE	Asia-Pacific Society for Computers in Education	www.apsce.net	ICCE	-
ASEE	American Society for Engineering Education	www.asee.org	FiE	Journal of Engineering Education
IEEE CS	IEEE Computer Society	www.computer.org/portal/web/guest/home	FiE, ICALT, ITS	Journal of Educational Technology & Society IEEE Transactions on Learning Technologies
IEEE ES	IEEE Education Society	ewh.ieee.org/soc/es	FiE	IEEE Transactions on Education IEEE Transactions on Learning Technologies IEEE Multidisciplinary Engineering Education Magazine
IEEE LT	IEEE Technical Committee on Learning Technology	lttf.ieee.org	ICALT, ITS	Learning Technology Newsletter
IFEES	International Federation of Engineering Education Societies	www.ifees.net	-	-
IGIP	International Society for Engineering Education	www.igip.org	-	Journal of Engineering Edcuation
ISLS	International Society of the Learning Sciences	www.isls.org	CSCL	International Journal of Computer-supported Collaborative Learning
SEFI	Société Européenne pour la Formation des Ingénieurs (*European Society for Engineering Education*)	www.sefi.be	-	European Journal of Engineering Education

It is interesting to provide some more information about IFEETS to highlight the large number of associations focused on engineering education worldwide. Some of the member societies are (see Table I): ASEE, IEEE, IGP and SEFI. The

rest of member societies are shown on Table II. This table includes associations of the majority of developed countries. In addition, there are several companies that are members: *Agilent Technologies, India* (www.home.agilent.com); *Autodesk* (www.autodesk.com); BOEING (www.boeing.com); *Dassault Systemes* (www.3ds.com); *Hewlett-Packard Company* (www.hp.com); *Infosys* (www.infosys.com); *SAE Brasil* (www.saebrasil.org.br); *Scalable Network Technologies* (www.scalable-networks.com); *Siemens* (www.siemens.org) and *The Math Works* (www.mathworks.com). The *Journal of Engineering Education* (see Table IV) is also a member.

TABLE II. SOME OF THE IFEES MEMBER SOCIETIES

Name	Area
Asociación Colombiana de Facultades de Ingeniería	Colombia
African Engineering Education Association	Africa
African Network of Science and Technical Institutions	Africa
Asociación Nacional de Facultades y Escuelas de Ingeniería	Mexico
Associacao Brasileira de Ensino de Engeniharia	Brasil
Australasian Association for Engineering Education	Australia and surroundings
Board of European Students of Technology	Europe
Cartagena Network of Engineering	-
Chinese Society for Engineering Education	China
Council of Deans Engineering Faculty of Chile	Chile
Council of Engineering Deans of Thailand	Thailand
Council of Research in Education and Sciences	Brasil
Engineers Canada / Canadian Engineering Accreditation Board	Canada
Engineering Council of South Africa	South Africa
Engineers for a Sustainable World	-
Engineering for the Americas	America
European Network for Accreditation of Engineering Education	Europe
Federal Council of Deans of Engineering of Argentina	Argentina
German Accreditation Agency Specialised in Accrediting Degree Programs in Engineering, Informatics, the Natural Sciences and Mathematics	Germany
Ibero-American Association of Institutes of Engineering Education	America, Spain, Portugal
Indian Society of Technical Education	India
Indo-US Collaborative for Engineering Education	India, USA
The Institution of Engineers, Singapore	Singapore
Instituto Superior de Engenharia de Lisboa	Portugal
The International Association for Continuing Engineering Education	-
Japanese Society for Engineering Education	Japan
Kazakhstan Society of Engineering Education	Kazakhstan
Korean Society of Engineering Education	Korea

Name	Area
Korean Society of Semiconductor Equipment and Technology	Korea
Latin American and Caribbean Consortium of Engineering Institutions	Latin America and Caribbean
Núcleo de Decanos de Ingeniería de Venezuela	Venezuela
Russian Association for Continuing Engineering Education	Russia
Russian Association for Engineering Education	Russia
Student Platform for Engineering Education Development	
Turkish Engineering Deans Council	Turkey
Unión Mexicana de Asociaciones de Ingenieros	Mexico
Upsilon Pi Epsilon International Honor Society for the Computing and Information Disciples	-
World Federation of Engineering Organizations, Committee on Capacity Building	-

B. Engineering Education Conferences

As other research disciplines, there exists a plethora of events (conferences, symposiums, workshops) where it is feasible to publish research works about engineering education. Moreover, many times the research works in engineering education are multi-disciplinary and in this way it is possible to publish them in several scopes. Anyway, there are also specific conferences more specially focused on engineering education.

Table III includes a list of the main events related with engineering education. The data provided for each event is the acronym, full name, involved associations, (geographical) area, first year edition, scheduled (annual or bi-annual character and months of the year in which it is celebrated), and classification in accordance with the CORE index. The first issue to notice is that there are some conferences with a history of near 40 years. Meanwhile, there are other conferences much more recent, some of them with an existence of 5 or 6 years. In relation with the geographical area there are localized conferences in the main continents except in Africa. The other conferences usually vary their localization from continent to continent.

To classify these events one of the more important research indexes is used. The Computer Research and Education of Australasia (CORE [1]) is an association of university departments of computer science in Australia and New Zealand to assist and advance research in computer science and information technology. In January 2008 this association published a ranking of ICT conferences classifying them in accordance to the quality of the papers into five tiers:

- Tier A+. Typically, a tier A+ conference would be one of the very best in its field or subfield in which to publish and would typically cover the entire field/subfield. These are conferences where most of the work is important (it will really shape the field), where researchers boast about being accepted, and where attendees would gain value from attending.

- Tier A. Publishing in a Tier A conference would add to the author's respect, showing they have real engagement with the global research community and

[1] http://www.core.edu.au Last access on November 2009.

that they have something to say about problems of some significance. Attending a Tier A conference would be worth travelling to if a paper was accepted.

- Tier B. This covers conferences where one has some confidence that research was done, so publishing there is evidence of research-active status (that is, there is some research contribution claimed, and a program committee that takes its job seriously enough to remove anything ridiculous or ignorant of the state of the art), but it's not particularly significant.

- Tier L. These are local conferences, which may be important for the social cohesion of the local community and for networking.

- Tier C. All the rest.

In this section we have just shown conferences in the tiers A+, A and B. There exist much more conferences related with engineering education in tiers L and C. Anyway, as it has been described, the relevance of these conferences from a research point of view is smaller.

TABLE III. MAIN ENGINEERING EDUCATION CONFERENCES

Acronym	*Full Name*	*Involved Associations [a]*	*Area*	*First Year Edition*	*Scheduled[b]*	*CORE[c]*
CSCL	Computer Supported Collaborative Learning	ISLS	-	1995	B (May-July)	A+
AIED	International Conference on Artificial Intelligence in Education	AIED	-	1981	B (May-July)	A
ICALT	International Conference on Advanced Learning Technologies	IEEE CS, IEEE LT	-	2001	A (June-July)	A
ICER	International Computing Education Research Workshop	ACM SIGCSE	-	2005	A (August-October)	A
ITiCSE	Annual Conference on Innovation and Technology in Computer Science Education	ACM SIGCSE	Europe	1996	A (June-August)	A
ITS	International Conference on Intelligent Tutoring Systems	ACM SIGCSE, AIED, IEEE CS, IEEE LT	-	1988	B (June-September)	A
SIGCSE	ACM Technical Symposium on Computer Science Education	ACM SIGCSE	USA	1969	A (February-March)	A
ACE	Australasian Conference on Computer Science Education	ACM SIGCSE	Australia and surroundings	1996	A (December-January)	B
ED-MEDIA	World Conference on Educational Multimedia, Hypermedia and Telecommunication	AACE	-	1987	A (June-July)	B
FiE	Frontiers in Education Conference	ASEE, IEEE CS, IEEE ES	USA	1971	A (October-November)	B
ICCE	International Conference On Computers in Education	APSCE	ASIA-Pacific	1989	A (October-December)	B
InSITE	Informing Science and IT Education Conference	ISI[d]	-	2001	A (June)	B
Koli Calling	Baltic Sea Conference on Computing Education Research	-	Baltic Sea Countries	2001	A (October-November)	B

a. See section III.A for more information about main associations in education engineering

b. Scheduled distinguishes between A (Annual) and B (bi-annual) conferences

c. Classification in the Australian Ranking of ICT Conferences

d. *Informing Science Institute* (informingscience.org)

C. Engineering Education Journals

This section includes some journals publishing papers about engineering education. Table IV includes the main journals in the engineering education discipline. The data provided for each journal is: name, URL, first year of publication, number of articles published the last year (2008), number of issues per year, the involved associations, the impact factor and the ranking. These last two items have been taken from the research indexes published by Thomson Reuters: the Journal Citation Reports (JCR) Science Citation Index (SCI) and Social Science Citation Index (SSCI).

In the SCI and SSCI the research relevance of a journal is given by its impact factor. Nevertheless, the impact factor is usually not taken into account as an absolute number, but in the context of the category in which the journal is included. In this way, these indexes arrange journals in several categories and the relevance of each journal is considered in accordance with its relative impact factor position regarding all the journals in the same category. Usually, the categories are arranged in four quartiles and the journals in the firsts quartiles are the more important ones. As the reader can see, some journals are included in several categories and in this case it is usually taken the more favorable classification.

1) Journals in the JCR Science Edition

There exist several journals related with engineering education in 6 areas. The aims and purposes of the main journals are the following ones:

April 14-16, 2010, Madrid, SPAIN
IEEE EDUCON Education Engineering 2010 – The Future of Global Learning Engineering Education

- *Computers and Education*. It is a technically-based, interdisciplinary forum for communication in the use of all forms of computing in the use of computing and Communications technology to contribute to all aspects of cognition, education and training, from primary to tertiary and in growing open and distance learning environments.

- *IEEE Transactions on Education*. The scope of this journal covers "educational methods, educational technology, instructional materials, history of science and technology, and educational and professional development, as well as programs within electrical engineering, computer engineering, and allied disciplines".

- *Journal of Engineering Education* focuses exclusively on scholarly educational research in engineering education.

- *Science and Engineering Ethics*. This journal explores ethical issues confronting scientists and engineers. "*Coverage encompasses professional education, standards and ethics in research and practice, extending to the effects of innovation on society at large*".

- *International Journal of Engineering Education*. This is an interdisciplinary journal, which tries to provide a balance between papers on developments in educational methods technology, case studies, laboratory applications, new theoretical approaches, educational policy and survey papers.

- *IEEE Technology and Society Magazine* covers a vast area of topics, including engineering ethics and professional responsibility, engineering education and technical expertise.

- *International Journal of Technology and Design Education* "encourages research and scholarly writing covering all aspects of technology and design education. The journal features critical, review, and comparative studies. In addition, it includes contributions that draw upon other fields such as historical, philosophical, sociological, or psychological studies that address issues of concern to technology and design education*".

- *Computer Applications in Engineering Education* focuses "*on the innovative uses of computers and software tools in education and for accelerating the integration of computers into the engineering curriculum*".

- *International Journal of Electrical Engineering Education* "*features articles and book reviews which highlight aspects of the teaching of current topics in electrical and electronic engineering. Within an engineering educational context, these can range from specific projects, case studies and reports of laboratory practice to broader developments such as new teaching methods, curriculum design, assessment, validation and the impact of new Technologies*".

TABLE IV.   MAIN ENGINEERING EDUCATION JOURNALS

Name	URL	First Year	Articles in 2008	Issues / year	Involved Associations	Impact Factor [a]	Journal Ranking [b]
Computers and Education	www.elsevier.com/wps/find/journaldescription.cws_home/347/description#description	1976	230	8	-	2,190 (SCI)	17/94 [1]:Q1
IEEE Transactions on Education	ieeexplore.ieee.org/xpl/RecentIssue.jsp?puNumber=13	1963	61	4	IEEE ES	1,400 (SCI)	7/24 [2]:Q2 83/229 [3]:Q2
Journal of Engineering Education	www.asee.org/publications/jee	1993	-	4	ASEE, IGIP	1,093 (SCI)	11/24 [2]:Q2 22/67 [4]:Q2
Science and Engineering Ethics	www.opragen.co.uk	1995	35	4	-	0,563 (SCI)	41/67 [4]:Q3 14/41 [5]:Q2 25/42 [6]:Q3
International Journal of Engineering Education	www.ijee.dit.ie	1985	124	6	-	0,552 (SCI)	17/24 [2]:Q3 42/67 [4]:Q3
IEEE Technology and Society Magazine	ieeessit.org/technology_and_society	1990	21	4	IEEE SSIT[c]	0,450 (SCI)	176/229 [3]:Q4
International Journal of Technology and Design Education	www.springer.com/education/journal/10798	1990	3	22	-	0,429 (SCI)	19/24 [2]:Q4 50/67 [4]:Q4
Computer Applications in Engineering Education	www3.interscience.wiley.com/journal/38664/home	1996	37	4	-.	0,388 (SCI)	89/94 [1]:Q4 21/24 [2]:Q4 53/67 [4]:Q4
International Journal of Electrical Engineering Education	www.ingentaconnect.com/content/manup/ijeee	1963	28	4	-	0,118 (SCI)	24/24 [2]:Q4 211/229 [3]:Q4
Journal of Educational Technology & Society	www.ifets.info	1998	84	4	IEEE CS IEEE LT	0,982 (SSCI)	42/113 [7]/Q2

a. Thomson Scientific 2008 Journal Citations Report (JCR). SCI: Science Citation Index. SSCI: Social Science Citation Index

b. Position in the subject category and quartile of the JCR. Subject categories: [1] Computer Science, Interdisciplinary Applications; [2] Education, Scientific Disciplines; [3] Engineering, Electrical & Electronic; [4] Engineering, Multidisciplinary; [5] History & Philosophy of Science; [6] Multidisciplinary Sciences; [7] Education & Educational Research

c. *IEEE Society on Social Implications of Technology* (www.ieeessit.org)

2) Journals in the Social Science Citation Index

In addition to the JCR SCI there are other publications in the JCR SSCI. One of the more important is the Journal of Educational Technology & Society. This journal *"seeks academic articles on the issues affecting the developers of educational systems and educators who implement and manage such systems". The articles should discuss the perspectives of educators and (educational system) developers' communities and their relation to each other"*.

Among the areas of the SSCI there is one named Education and Educational Research. This area includes 113 journals. It is important to notice that some journals are listed both in the SCI and in the SSCI, for example the *Journal of Engineering Education* and *Computers and Education*. Not all the journals in this category accept papers about engineering education, but some of them have as scope evaluation methods, case studies, innovative pedagogical methods, curriculum organization, etc.

3) Other Journals

There are several journals not indexed in the JCR but it is quite feasible that they will be indexed in the near future. These journals have not been included in the JCR because they have been initiated in recent years (it is needed some years to enable the calculation of the impact factor) or because they are just published on-line (up to date, just paper journals are considered in this index). Anyway, the following journals are very interesting and they use to include valuable articles:

- *ACM Transactions on Computing Education* (toce.acm.org). This journal was named as *Journal on Educational Resources in Computing* (JERIC) until January 2009. Endorsed among other ACM groups by the SIGCSE, it is intended to support all aspects of computing education. The intention of its editors and directors is *"that TOCE become the most prestigious and influential publication in computing education"*.

- *Engineering Education: Journal of the Higher Education Academic Engineering Subject Centre* (www.engsc.ac.uk/journal/index.php/ee/about/editorial Policies#focusAndScope). Published twice a year since 2006 including two types of articles: (i) papers on any topic relevant to engineering education as pedagogic research papers, case studies, critical reviews and evaluations; and (ii) comments with scholarly responses to previously published articles from the journal.

- *European Journal of Engineering Education* (www.tandf.co.uk/journals/tf/03043797.html). It is published six times a year since January 2006 by the SEFI to provide a forum for dialogue between researchers and specialists in the field of engineering education mainly at European levels.

- *IEEE Multidisciplinary Engineering Education Magazine* (www.ewh.ieee.org/soc/e/sac/meem/index. php/meem). It is the official publication of the IEEE ES Student Activities Committee since 2005. This journal is run for and by students. It focuses on *"education, bearing in mind that the expected readers are the students/teachers/facilitators who will be responsible for designing educational programs"*.

- *IEEE Transactions on Learning Technologies* (www.computer.org/portal/web/tlt). It is a joint publication of the IEEE CS and IEEE ES initiated in 2008 and with 4 numbers per year. This journal covers research on such topics as: innovative online learning systems, intelligent tutors, educational software applications and games, and simulation systems for education and training.

- *Inroads – SIGCSE Bulletin* (jinfo.lub.lu.se/jinfo?func= fullRecord&jId=14692&issn=10963936). Published since 1969 twice a year by the ACM SIGCSE it provides *"a forum for university educators to discuss concerns about development, implementation, and evaluation of computer science programs and courses, as well as syllabi and problem sets"*.

- *International Journal of Artificial Intelligence in Education* (ihelp.usask.ca/iaied/ijaied/). This is the official journal of the AIED Society. It was initiated in 1989 and publishes 4 numbers per year with papers and other items (e.g. workshop proceedings, conference reports, invited powerpoint presentations, news items, etc.) concerned with the application of artificial intelligence techniques and concepts to the design of systems to support learning.

- *International Journal of Computer-Supported Collaborative Learning* (ijcscl.org). Its publication was initiated in 2006 by the ISLS to promote a deeper understanding of the nature, theory and practice of the uses of computer-supported collaborative learning. A main focus is how people learning in the context of collaborative activity and how to design the technological settings for collaboration.

- *Learning Technology Newsletter* (www.ieeetclt.org/content/newsletter). It is published 4 times per year since 1999 to report the activities of the IEEE LT.

IV. ENGINEERING EDUCATION IN SPAIN

Similarly to the worldwide level, engineering education in Spain has been developed as a proper discipline. This can be supported by the existence of several associations, conferences and journals. Next sections provide an outlook to the more important ones.

A. Associations

During the last years the CESEI has been a main actor in the promotion of engineering education as a main practice and research disciplines. A main proof of its activities has been the organization of awards to the best final studies project and PhD thesis during the last four years [6].

In addition to the Spanish chapter of the IEEE Education Society, there exist the following associations related with the engineering education:

- ADIE: *Asociación para el Desarrollo de la Informática Educativa* (www.adie.es/webadie/).

- AENUI: *Asociación de Enseñantes Universitarios de la Informática.*

- GEIDI: *Grupo de Estudio e Innovaciones Docentes de la Informática.*

- *Ibero-american association of institutes of engineering education.*

- Spain SIGCSE Chapter (www.sigcse.es).

B. Conferences

The following conferences accept contributions about engineering education:

- *Jornadas de Enseñanza Universitaria de la Informática* organized by the AENUI.

- CITA: *Congreso Iberoamericano de Telemática.*

- CUIEET: *Congreso Universitario de Innovación Educativa en las Enseñanzas Técnicas.*

- SIIE: *International Symposium on Computers in Education.*

- FINTDI: *Fomento e Innovación con Nuevas Tecnologías en la Docencia de la Ingeniería.*

- TAEE: *Tecnologías Aplicadas a la Enseñanza de la Electrónica.*

C. Journals

There are several journals in Spain or in the Latin-America area that publish papers about engineering education:

- IEEE RITA: *Revista Iberoamericana de Tecnologías del Aprendizaje* (webs.uvigo.es/cesei/RITA).

- *Novática* (www.ati.es/novatica) is not focused on education, but it publishes papers on this topic.

- *Revista de Educación* (www.revistaeducacion.mec.es) from the *Instituto Nacional de Evaluación y Calidad del Sistema Educativo.*

- *ReVisión* (ww.aenui.net/ReVision) published by the AENUI.

- CIEET: Cuadernos de Innovación Educativa en las Enseñanzas Técnicas published by the Board of Directors of Schools of Technical Engineering

- RIE: *Revista de Investigación Educativa* (www.um.es/depmide/RIE).

- RIED: *Revista Iberoamericana de Educación a Distancia* (www.utpl.edu.ec/ried).

V. CONCLUSION

Engineering education has flourished as a great discipline during the last years. In this way, there are a large number of associations involved organizing conferences and publishing journals on several topics of this area. At this point, it is usually a problem to identify the key actors and sources of information. The Technical Committee of the CESEI is trying to support this discipline. Particularly, it tries to identify the main actors involved, their goals and main activities. This paper includes a compilation of some of this data. We hope it can be valuable for novice and common users that at some point need precise information about this domain.

In any case, this cannot be considered as a finished work and we will continue updating it. Similarly, any contribution or comment is welcomed.

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