

# Scientific Communication between Spanish and English Educational Technology Journals. A Citation Analysis of eight Journals

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## ABSTRACT

In order to disseminate the findings and recommendations from their studies, researchers publish papers in scientific journals in their subject area. Research communities thus emerge as a result of the communication between authors who cite other relevant papers. This study focuses on the relationships between Spanish and English research communities in the specific field of Educational Technology. We explore as hypotheses whether there are signs of scientific journal communication between authors in these two communities, and if the English authors reciprocate citations by Spanish authors. In order to verify them, a social network analysis was conducted by considering outgoing and incoming citations in eight open access journals (four in English and four in Spanish) published over ten years (2007-2016). The sample includes 3,407 articles, which were analysed using UCINET and Gephi software. The results show partial confirmation of the hypotheses, since two separate research communities were recognized, with almost no communication between them. However, the Spanish community was presented as more connected than the English one. We interpret these results by considering not only language factors, but also the journal roots and the particular subject field under consideration. Finally, we highlight some general recommendations to enhance future communication between these two education research communities.



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## 1 INTRODUCTION

Reading journal articles and publishing their own research results are a fundamental aspect of the life of academics in order to make meaningful contributions to their particular field of study. By consulting the list of references in particular research papers, researchers also have a valid way of finding out about other articles related to their topic, and which other journals serve the same area. Moreover, citing an article is an acknowledgment of the work of other researchers and constitutes an objective way of evaluating other studies (Franco,

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Sanz, & Culebras, 2016). Such activities contribute towards building a research community network and demonstrate the exchange of scientific information in the "intellectual structure of a given discipline" (Liu and Wang, 2005, p.308). Community networks can be explored by analysing the citation patterns among different journals, and by using social networking analysis. Liu and Wang (2005, p. 308) suggest that citation analysis has been frequently used to explore the knowledge structure of a given discipline and that "internal and external scholarly communication of a discipline can be understood by mapping its published literature". However, looking at citations presents certain limitations, which are important to acknowledge. For example, citations may be produced for other purposes besides conveying background literature, such as self-citing (own publicity) or criticizing another's work. There are also reasons for a lack of citation, such as not being aware of prior research, previous literature not considered to be relevant, or difficulties in accessing the work (e.g. a fee may be required, or the article may be in another language). Nevertheless, citation data provides an objective measure to describe the flow of communication in a research discipline (and by implication the creation of scientific communities), as well as the relationships between journals (Zawacki-Richter & Anderson, 2011).

Various considerations need still to be taken into account. Different studies in the bibliometric field, which are mentioned as follows, show that the language in which academic papers are written is clearly decisive when papers are selected for citation. For instance, Leon-Sarmiento, Leon-S, and Contreras (2007) found that papers published in English language journals seldom cite articles published in other languages. Furthermore, articles written in English have a better chance of being cited in journals in the same language, since databases contain a considerably higher percentage of English articles (in all fields) compared to any other language, including Spanish - and this situation is more acute in social sciences and humanities (Buela-Casal, 2003; Franco et al., 2016; López-Navarro, Moreno, Quintanilla, & Rey-Rocha, 2015; Ruiz-Corbella, Galán, & Diestro, 2014). This situation constitutes a significant language bias in journal impact factors. Current initiatives such as the Information Matrix for the Analysis of Journals (MIAR<sup>1</sup>) (Urbano et al., 2005), the Integrated Classification of Scientific Journals (CIRC) with the focus on social sciences and humanities journals (Torres-Salinas et al., 2010; Torres-Salinas & Repiso, 2016), the national award of the FECYT seal for Spanish quality journals<sup>2</sup> (originated in 2016) and Altmetrics (Torres-Salinas, Cabezas-Clavijo, & Jiménez-Contreras, 2013) can elevate the visibility of Spanish journals. Another study presents Google Scholar as a very useful tool for examining the social sciences works in non-Anglophone countries compared to traditional bibliographic databases (Gantman & Dabós, 2018). These tools allow researchers to compare Spanish publications in a specific field with a selection of relevant papers internationally and to access available - but usually dispersed - information on the quality of the respective journals. In addition, Altmetrics enables researchers to track and consider the online impact of their publications in different virtual spaces, as an alternative indicator of impact that is gaining relevance in the new context of open science and open

<sup>1</sup><http://miar.ub.edu/>

<sup>2</sup><https://evaluacionarce.fecyt.es/>

access for Education journals (Diestro, Ruiz-Corbella, & Galán, 2017). However, there is also skepticism regarding the usefulness of those alternative bibliometric indicators and methods without additional measures for scientific evaluation, especially in Spain and Latin America (Robinson-García, Repiso, & Torres-Salinas, 2018).

In order to find out if these statements are also true for the Educational Technology (ET) field - in which many recognized journals are published in Spanish - we analysed the ET research communities in English and Spanish. This article maps out the structure of ET journal networks using cross-citation data to investigate the communication patterns between the Spanish and English-speaking worlds, based on eight selected journals in the field. Although we are aware that citation analysis is not one of most often methods within Education, the contribution of this paper focuses on the specific community of ET within the Education area and offers an alternative methodological perspective to look at the educational phenomenon in future work.

Our hypotheses are the following:

- The Spanish and English ET research communities are two distinct communities with little communication between them.
- Spanish ET authors cite English papers, but English ET authors do not reciprocate citations.

Therefore, the objectives of the study are:

1. Analyse the communication patterns between Spanish and English ET research communities.
2. Identify differences in the communication patterns among Spanish and English ET research communities.

The following research questions related to the objectives were then explored:

- Are Spanish and English research communities in the field of ET isolated from each other?
- How often do Spanish authors cite English papers in the field of ET, and vice versa?
- What are the communication patterns between Spanish and English ET journal networks?

The answers to these questions are presented in this paper, together with implications and conclusions.

## 2 MATERIAL AND METHODS

### 2.1 Social Network Analysis

In this study, social network analysis (SNA) was applied to unveil communication patterns between the two research communities through their publications in academic journals in

the field of ET. SNA is an interdisciplinary approach that combines network and graph theory to represent the relationships between actors in the form of a social network diagram (Haythornthwaite, 1996; Wasserman & Faust, 1994). It is one of the most current and frequently used research methods to produce visual representations of scholarly communication networks in the social and behavioural sciences (e.g. in the field of distance education, see Zawacki-Richter and Anderson, 2011). For instance, SNA has also been used within the Education area to analyse the differences in the development of personal networks of high and low-performing students based on their final academic grades and their participation in two online courses (Casquero, Ovelar, Romo, & Benito, 2015), to conceptualise and explore virtual communities (Chiu, Hsu, & Wang, 2006; Dholakia, Bagozzi, & Pearo, 2004) or to analyse patterns of international student mobility (Kondakci, Bedenlier, & Zawacki-Richter, 2018).

Within the broader method of SNA, citation analysis enables the study of the structure of different disciplines, based on the relationships among authors, articles and journals as measured by citations of sources within published papers (Otte & Rousseau, 2002; Rice, Borgman, Bednarski, & Hart, 1989). Another tool is network theory (Borgatti, Mehra, Brass, & Labianca, 2009), which has been used to examine the relationships between journals and their similarities in citations, in order to generate citation matrices and maps of journals (Xhignesse & Osgood, 1967). The same authors found that perhaps the best single index of a journal's scholarliness is the density of citation, that is, how much its authors depend upon their knowledge of the work of others (Xhignesse & Osgood, 1967).

Vargas et al. (2010) define social networks as the relationships between research individuals and organizations that work and exchange information among themselves, through nodes of high productivity. While connecting with others, researchers share their expertise and knowledge (social capital). Within such networks, individuals and organizations tend to be familiar with only that part of the overall social network to which they belong. Therefore, in order to increase the sharing of social capital, it is important for each member in the network to reach out and communicate with others beyond those to whom they are directly connected. Every member of the network is called a 'node' (actor), and the connections or relationships among them are called 'edges' (ties) (Wasserman & Faust, 1994).

We summarize the research method used in this study for the analysis of communication patterns across various selected journals as 'journal network analysis,' based on SNA. The collection of ET journals can be described as a network, in which nodes are the journals and the ties or edges are the citations between them. Using SNA, different aspects of the network can be investigated, such as the relationships, prestige and centrality of the actors (the journals).

For example, the *degree* of a node,  $d(n_i)$ , in a network is the number of ties that are incident with it or the number of nodes adjacent to it (Wasserman & Faust, 1994). A prominent, *central* journal in the network is one that is extensively involved in relationships with other journals in terms of citations. The *outgoing-incoming* ratio is defined as the number of citations a journal sends to another journal divided by the frequency with which the journal receives citations from other journals in the network. High values suggest that the journal

is a 'feeder' of citations, while lower values suggest that the journal is a 'storer' of citations. The *self-feeding ratio* is defined as the relative frequency with which a journal cites itself. The *prestige* or *status* of a journal in the network increases as it becomes the object of more ties (known as the *indegree*), but not necessarily when ties are initiated by the journal itself (*outdegree*). Therefore, another important concept is *network congruence*, which is defined by the extent to which journals in the network cite other journals in proportion to the number of times they are themselves cited by those journals (see Eigel, 1975, for congruence in journal networks). Thus, in a network with a high congruence,  $X_{ik}$  is highly correlated with  $X_{ki}$ .

In addition, the absolute level of citation depends on the size of the journal (larger journals with more issues and papers per volume probably receive more citations than smaller journals (Table 1); however, the citation *pattern* is not a function of size. Thus, the structure of the journal network must be viewed without any confounding effects due to size by standardizing the outgoing and incoming citations, which is done by dividing them by the number of papers published between the considered periods of time in each journal. The mean standardized tie density can be used as a cut-off point to produce dichotomized citation matrices in which tie densities above that point are coded as 1, and below it as 0 (Doreian & Fararo, 1985).

There are many software applications, both free and commercial, that can be used for SNA and hence for journal network analysis. Such applications usually offer the following sort of functionality that is characteristic of this method of analysis: 1. researchers can represent data in a systematic way; 2. different means of data visualization are possible; 3. researchers can characterize the data by indicators (density, distance, centrality...); and 4. insights are enabled to detect community formation. The most well-known free SNA tools are Pajek (used by Vargas et al., 2010) and Gephi (open source) (used by Bastian, Heymann, and Jacomy, 2009). Commercial SNA tools include UCINET and Net-Draw (Zawacki-Richter & Anderson, 2011). In the current work both UCINET 6 (Borgatti, Everett, & Freeman, 2002) and Gephi 0.9.1 software (Bastian et al., 2009) were employed. Gephi uses the Louvain method (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008) to highlight communities that are evident in networks. The community detection algorithm creates a modularity class value for each journal, which is helpful for the posed objectives.

## 2.2 Sample

Eight Educational Technology journals were selected as a sample for the journal network analysis in this study (see Table 1). Since the number of Spanish ET journals was smaller than the English one, the sample of Spanish journals were selected in the first place, based on their thematic content (mostly publishing ET general -related articles and not focusing on specific subtopics, such as, e.g., distance education or e-learning), being well-established journals of the field for longer time and a Spanish origin<sup>3</sup>. The selection of the English ET journals was done next and, in order to choose the most comparable publications possible,

<sup>3</sup>List of Educational Spanish scientific journals (with at least 100 papers in the last 5 years): <https://www.revistacomunicar.com/metaranking/metaranking.php?area=educacion>

we followed these criteria, in addition to the thematic ones:

- Open Access journals, with no need to pay a subscription fee to access articles and without article processing charges, as was the case of the selected Spanish journals. Different authors have shown that open access articles have a greater research impact in terms of citations per article and are also cited earlier than papers in non-open access journals, among other factors, due to their free availability on the Internet, among other factors (Antelman, 2004; Gargouri et al., 2010; Harnad & Brody, 2004; Zawacki-Richter, Anderson, & Tuncay, 2010)
- Similar impact in terms of cites per paper of each of the Spanish journals calculated using the 'Publish or Perish' software that Google Scholar employed as a source (Harzing, 2007) during the time period 2014-2016 (as of summer 2017), since not all the journals were on Scopus or Social Sciences Citation Index (SSCI), particularly the Spanish ones.

All full papers (N=3,407) published in the selected journals between 2007 and 2016 were included in the sample. Study book reviews, editorials, erratum, etc. were excluded from the sample. The year chosen as the start date (2007), corresponds (for some of the publications) to the beginning of them being indexed in Scopus. This database was chosen over SSCI and others based on the inclusion of most of the issues of the journals selected.

**Table 1** Selected journals for the study. (n is the number of articles published between 2007 and 2016)

Journal	Start year of publication	Language**	n	%
International Journal of Computer-Supported Collaborative Learning (IJCSCL)	2006	English	196	5.75
IEEE Transactions on Learning Technologies (IEEE TLT)	2008*	English	265	7.78
Australasian Journal of Educational Technology (AJET)	1985	English	565	16.58
Educational Technology and Society (ETS)	1998	English	986	28.94
Comunicar	1993	Spanish and English	555	16.29
RUSC. Universities and Knowledge Society Journal/Revista de Universidad y Sociedad del Conocimiento***	2004	Spanish and English	257	7.54
EduTec-e. Revista Electrónica de Tecnología Educativa	1995	Spanish	274	8.04
Píxel-bit. Revista de Medios y Educación	1994	Spanish	309	9.07
Total (N)			3,407	100

Note: \* IEEE TLT started publication from 2008, so it does not have any papers published in 2007. \*\* Some of the Spanish journals started publishing articles only in Spanish, but they now publish articles both in English and Spanish (e.g. Comunicar) or only in English (e.g. RUSC, since 2016). \*\*\* Since 2016: RUSC changed to become International Journal of Educational Technology in Higher Education (IJETHE). The journal was bilingual from 2010 to 2015.

We acknowledge that the sample of selected Spanish and English ET journals was reduced to match each by each the impact described; therefore, others could still meet the criteria to be in the sample (e.g. Digital Education Review -DER- or Revista Iberoamericana de Educación a Distancia -RIED- from the Spanish side, or the International Review of Research in Open and Distributed Learning IRRODL- as English ET journal).

The four Spanish journals in the sample emerged originally in Spain: *Comunicar* in Huelva, *Píxel-Bit* in Sevilla, *Edutec* in Palma de Mallorca and *RUSC/IJETHE* in Barcelona. Only two of them remain as university-managed publications: *Píxel-Bit* by the University of Sevilla, and *Edutec* by the University of the Balearic Islands (although this journal is edited by the Ibero-American *Edutec* Association). *Comunicar* is managed by the private and non-profit association with the same name; *IJETHE* started originally to be edited by the Open University of Catalonia and currently published by Springer. Regarding the subject field, all the Spanish journals have 'Education' as an exclusive subject field, with the exception of *Comunicar*, which lists 'Mass Communication' as its major subject area (according to MIAR). The four of them are considered the most well-recognised and oldest Spanish journals in the field of Educational Technology.

The four English journals have various origins. *IJCSSL* is supported by the International Society of Learning Sciences and is edited by Springer. Its focus is on Computer-Supported Collaborative Learning, combining technical issues and educational aspects, and it was founded in cooperation between Germany and the United States. *AJET* has its origins in Australia and it is published by the Australasian Society for Educational Technology, with a focus on studies in post-school educational settings. *ETS* and *IEEE* were both founded in the USA and are published respectively by the IEEE Computer Society and the Institute of Electrical and Electronics Engineers. For all of these journals (with the exception of *AJET*), the first subject area specified in the Scientific Journal Rankings (SJR) ranking is either 'Engineering' and/or 'Computer Science', and in second place is 'Social Sciences' with 'Education' as a subcategory. *AJET* has as an exclusive subject area and category 'Social Sciences' > 'Education'; in other words, there is no 'Engineering' or 'Computer Sciences' in the first field.

All journal issues were indexed in Scopus, with the exception of *Edutec-e* and *Píxel-bit*, and those in *AJET* in 2007, *Comunicar* in 2007 and *RUSC* between 2007 and 2011. In addition, during the analysis, some articles in specific issues were detected as not being indexed in Scopus. In those cases, the citations between the journals were counted manually based on the information available in the journals' websites.

The data collection strategy via Scopus included searching for the source title (title of the journal), filtering by year and type of publication (articles only) and selecting the option to obtain the references used in those articles. Then the source title was filtered again to check the sample of journals. The dataset was collected and counted by creating tables in a Microsoft Excel file.

### 3 RESULTS

#### 3.1 Citation network matrix

The network of outgoing and incoming citation ties is presented in as an 8x8 matrix whose  $X_{ij}$  elements give the frequency with which the  $j^{th}$  journal cites articles published in the  $i^{th}$  journal. Between 2007 and 2016 a total of 3,407 articles were published in the eight journals. These articles contained a total of 3,431 citations within the network.

**Table 2** Citation network (2007-2016)

		Cited Journal								Total b	Total b*
		J1	J2	J3	J4	J5	J6	J7	J8		
IJCSCL	J1	173	8	3	18	0	0	0	0	202	29
IEEE TLT	J2	49	104	11	57	0	0	0	0	221	117
AJET	J3	33	8	390	87	0	1	0	0	520	130
ETS	J4	74	41	103	596	2	0	1	0	818	222
Comunicar	J5	6	1	5	12	232	14	8	28	309	77
RUSC/IJETHE	J6	2	4	15	14	17	100	12	30	194	94
EDUTEC	J7	12	2	15	17	70	62	234	127	545	311
Pixel-Bit	J8	1	1	11	19	92	48	74	387	641	254
<b>Total a</b>		350	169	553	820	413	225	329	572	3431	
<b>Total a*</b>		177	65	163	224	181	125	95	185		1215
<b>Self-feeding ratio</b>		0.49	0.62	0.71	0.73	0.56	0.44	0.71	0.68		

Note: a=incoming citations; b=outgoing citations; \*=self citations excluded

The entries in Table 2 can be viewed in terms of overall levels of citation (and corresponding densities) and patterns of citation. The citation data consists of valued directional relations in which the strength or intensity of each tie is recorded as the number of outgoing and incoming citations.

### 3.2 Network density

The density of this valued network is the total of all values (3,431 citations) divided by the number of possible ties (64 entries in the 8x8 matrix). This yields a mean citation rate across all journals of 53.6, which we refer to as the overall citation 'tie density'.

It should be noted that this type of network analysis (i.e. outgoing and incoming citations) is biased towards journals that have been published for a longer period of time (such as AJET or EDUTEC). A journal that did not publish prior to 2007 (IJCSCL and IEEE TLT) obviously cannot be cited for publications before that date, whereas older journals potentially gain citations from the date of first publication. To control for the different journal sizes, the outgoing and incoming citations were standardized by dividing them by the number of papers published between 2007 and 2016 in each journal. This yields a value of 3.5 total citations per paper (excluding self-citations) and an overall standardized tie density of 0.06 citations per paper in the 8x8 matrix.

It is remarkable that the number of self-citations, i.e. citations to other papers published in the same journal, is relatively high in this network of English and Spanish educational technology journals. The self-feeding ratio is defined as the relative frequency with which a journal cites itself. The average self-feeding ratio is 0.62 in the total network, ranging from 0.44 (RUSC) to 0.73 (ETS).

In addition, the density for the Spanish and English journal networks were looked at separately in the standardized citation network values. Whereas the English network has a density of 0.086 (excluding self-citations), the mean citation rate between the Spanish

journals is almost as twice as high (0.163).

**Table 3** Standardized citation network (2007-2016)

	Cited Journal								Total b	
	J1	J2	J3	J4	J5	J6	J7	J8		
IJCSCS	J1	0.883	0.041	0.015	0.092	0	0	0	0	1.031
IEEE TLT	J2	0.185	0.392	0.042	0.215	0	0	0	0	0.834
AJET	J3	0.058	0.014	0.690	0.154	0	0.002	0	0	0.919
ETS	J4	0.075	0.042	0.104	0.604	0.002	0	0.001	0	0.829
Comunicar	J5	0.011	0.002	0.009	0.022	0.418	0.025	0.014	0.050	0.551
RUSC/IJETHE	J6	0.008	0.016	0.058	0.054	0.066	0.389	0.047	0.117	0.755
EDUtec	J7	0.044	0.007	0.055	0.062	0.255	0.227	0.854	0.464	1.967
Pixel-Bit	J8	0.003	0.003	0.036	0.061	0.298	0.155	0.239	1.252	2.049
<b>Total a</b>		1.267	0.517	1.009	1.265	1.039	0.798	1.156	1.883	17.867

Note: a=incoming citations; b=outgoing citations

The standardized tie density (i.e. 0.06 citations per paper for the overall network) was used as the cut-off point, to draw an image matrix of the network (Table 4). The rows show the citing and the columns the cited journals.

**Table 4** Dichotomized image matrix using mean cut-off ( $\geq 0.06$  citations per paper)

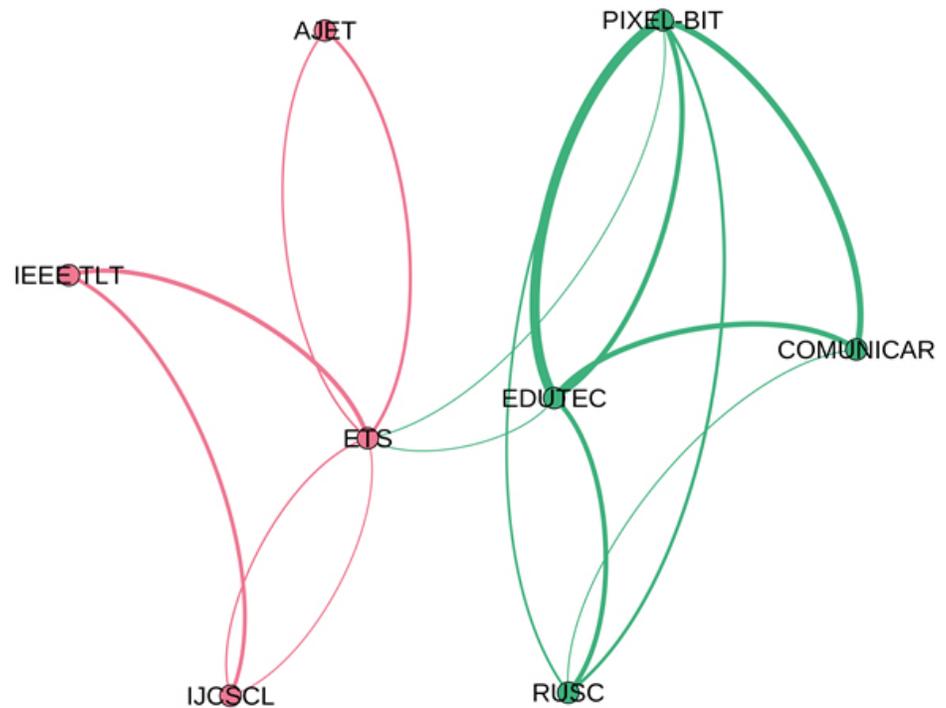
	J1	J2	J3	J4	J5	J6	J7	J8
IJCSCS	J1	-	0	0	1	0	0	0
IEEE TLT	J2	1	-	0	1	0	0	0
AJET	J3	0	0	-	1	0	0	0
ETS	J4	1	0	1	-	0	0	0
Comunicar	J5	0	0	0	0	-	0	0
RUSC/IJETHE	J6	0	0	0	0	1	-	1
EDUtec	J7	0	0	0	1	1	1	-
Pixel-Bit	J8	0	0	0	1	1	1	-

The network graph depicted in Figure 1 is based on the dichotomized matrix in Table 3, showing ties that are above the cut-off point (0.06 citations per paper). If the number of citations per paper is less than or equal to 0.06, the tie is coded as absent; otherwise, the tie is coded as present.

### 3.3 Network modularity

The community detection algorithm of Gephi creates a modularity class value for each journal, which is used to color code communities within the Educational Technology research network (see Figure 1). The analysis shows the existence of two sub-networks: the English (red nodes) and Spanish (green nodes) groups of research journals.

Looking at relationships between English (red ties) and Spanish journals (green ties), the figure reveals that they exchange information mainly within their respective research



**Figure 1** Network diagram of standardized citing and cited data with threshold  $\geq 0.06$

communities, with 3.61 citations per paper within the English group of journals and 4.87 citations per paper within the Spanish group. Authors who publish in Spanish journals refer to papers that are published in English journals (0.45 citations per paper), but their citations are not reciprocated (there are only 0.005 citations per paper from English to Spanish journals). Above the threshold of 0.06 citations per paper, only Pixel-Bit and EDUTECH refer to ETS but not vice versa.

### 3.4 Centrality and prestige

Based on the standardized citation data (excluding self citations), the most central journal in terms of the highest total number of incoming citations per paper (indegree) is ETS (0.66), followed by three Spanish journals: Pixel-Bit (2.06), Comunicar (0.62), and RUSC (0.41) (Table 5).

### 3.5 Outgoing-incoming ratio and network congruence

The top 'storsers' of citations are journals that receive many more citations from other journals than they send out (above 1.0): IJCSCL (0.58) and Comunicar (0.75), while EDUTECH (1.66) and IEEE TLT (1.31) are the strongest 'feeders'. Journals that show a congruent citation pattern with an outgoing-incoming ratio around 1 are ETS (0.97), Pixel-Bit (1.07), and AJET (0.91). The correlation between outgoing and incoming citations (*Network congruence*) reveals that the total journal network in this study is quite symmetric ( $r = 0.88$ ).

**Table 5** Ranking of journals based on standardized indegree (citations per paper), excluding self-citations

Rank	Journal	StdIndegree	Indegree*
1	J4 ETS	0.66	224
2	J8 Píxel-Bit	0.6	185
3	J5 Comunicar	0.62	181
4	J6 RUSC/IJETHE	0.41	125
5	J1 IJCSCS	0.38	177
6	J3 AJET	0.32	163
7	J7 EDUTEC	0.30	95
8	J2 IEEE TLT	0.12	65

Note: \*Total number of incoming citations, self-citations excluded

## 4 DISCUSSION AND CONCLUSIONS

The SNA of the two groups of journals in our sample confirms both our hypotheses. Concerning the first hypothesis, two ET research communities can be clearly distinguished by the language of publication, but the communication between them is rather sporadic. Only two of the Spanish journals (Píxel-Bit and Edutec) cite the English journal ETS to a notable extent, but no substantial ties were identified from the English journals to the Spanish ones. That fact confirms our second hypothesis: Spanish ET authors cite papers in English journals, but they are not reciprocated. In addition, it should be mentioned that, although the network congruence was found to be quite symmetric, [Zawacki-Richter and Anderson \(2011\)](#) found a lower average self-feeding ratio (0.47) than in this ET network (0.62) in a similarly thematic English journal network (distance education), which may suggest that some journals in our network have a self-citing pattern higher than the others and should be considered as a limitation for the study.

Regarding the first research objective, we can then highlight an isolated communication pattern between Spanish and English ET research communities, which could be interpreted in different ways. In this study, we cannot attribute it to the need for a subscription fee, since we purposefully selected open access journals. The most plausible reason could be lack of knowledge of the language in which the other journal is published (more probable within the English community). Our findings confirm the ones of different authors, such as [Franco et al. \(2016\)](#), [López-Navarro et al. \(2015\)](#), and [Leon-Sarmiento et al. \(2007\)](#), namely that journals which publish in English seldom cite articles published in other languages (in this case, Spanish). However, even in the case of the hybrid journals, in which both English and Spanish articles can be found, there are no meaningful ties to give support to the argument that having English articles would result in more citations by authors that write in that language. The originally Spanish-based journals, regardless of containing English articles (RUSC/IJETHE) or publishing in both languages (Comunicar), are not taken into account by the authors that publish in English-speaking journals. In contrast to the study by [Franco et al. \(2016\)](#), we cannot prove from our sample that English articles have higher chances of being cited in English journals. It should also be noted that some of the Spanish journals were indexed in different recognized databases and most of them offer an abstract of

the papers in both Spanish and English, which may be helpful to increase their visibility, but that was not the case in our study regarding the communication between English and Spanish journals. Thus, other reasons might be credible for both research communities: for example, not being aware of prior research, or considering previous literature as not relevant. We also point towards the differences among the subject topics in both research communities; and in other words, to the scope of the various journals, which was mentioned in the description of their subject fields.

Concerning the second research objective, differences in the communication patterns among Spanish and English ET research communities were identified: the Spanish ET research community seems to be closer and more tightly connected than the English one as the tie densities for each network show in our study. We can sustain that there is a higher level of communication between papers in the Spanish journals in terms of citations, since the mean citation rate is almost as twice higher than in the English network. That is especially the case for *Comunicar*, *Píxel-Bit* and *EduTec*, which could be partially explained by their relatively close launch years (1993, 1994 and 1995 respectively) at that time, no Spanish journals existed in this field (there were only general education or pedagogy journals). Other plausible reasons might be that the Spanish ET research community (and thus, the editorial teams of the journals) is smaller than the English one, meets regularly at similar national and Ibero-American conferences, and it is often active in sharing their work in academic and non-academic social networks. Therefore, even though language may be an important factor (Buela-Casal, 2003; Franco et al., 2016; Leon-Sarmiento et al., 2007; López-Navarro et al., 2015; Ruiz-Corbella et al., 2014), a further possible relevant element regarding the communication between the research communities may be the origin and editorial structure of the journals.

As limitations of the study, we acknowledge the small sample of selected Spanish and English ET journals and that a broader one may bring different results. However, previous research within bibliometrics, which is considered in this section, as well as in the introduction, seems to point towards this trend not only in Education, but also in a range of disciplines. Even though, our study brings a modest contribution to the provision of clear evidence regarding the need to find a way to bridge knowledge between those communities. Another limitation resides in the method used, which is limited inasmuch as it characterises the relationships between the Spanish and the English ET communities just in terms of journal citations. Other methods could shed light on different kinds of collaboration and/or provide nuanced interpretations of the results obtained in this study.

In line with the aims of different Spanish initiatives (CIRC, MIAR, FECYT seal), together with the implications of this study, we suggest that there is a need to improve the visibility of all the journals - especially the ones written in languages other than English and in social sciences and humanities - and to raise awareness of the research conducted in similar fields. Some guidelines for authors and readers of the Spanish and English ET communities include:

- Consulting comprehensive databases of peer-reviewed journals published in different countries (e.g., Latindex, SciELO, RedALyC) (Salager-Meyer, 2015) and using non-

traditional bibliographic databases, such as Google Scholar (Gantman & Dabós, 2018; Zhang, Lun, & Yang, 2017)

- Incorporating in the own papers English-written titles, extended abstracts and keywords, along with translations of papers into English, when possible (Salager-Meyer, 2015).
- Considering alternative metrics such as taking advantage of Web 2.0 sharing and commenting possibilities and promoting open access measures, which should come along with decisions on the strategies for scientific digital dissemination of the universities (Diestro et al., 2017; Torres-Salinas, Castillo-Valdivieso, Pérez-Luque, & Romero-Frías, 2018) and with changes in the evaluation processes of the scientific activity in Spain and Latin America (Rafel, 2016; Robinson-García et al., 2018).

As Ruiz-Corbella et al. (2014) point out, in social sciences and humanities there is no homogeneity internationally in the research interests and cultural differences, which include the cultural richness of languages, but also the differences in the contextualization of the topics, therefore should be closer considered than in other discipline areas. In addition, the same authors highlight that the Spanish research in our subject area is a referent for the Ibero American world and for the increasing Spanish-speaking population. Accordingly, research communities in Education could be developed further, with closer communication links including Spanish and English sides -in addition to other languages. In turn, such initiatives could enhance better knowledge transfer within the specific field of Educational Technology.

Future studies could also explore the authors' knowledge regarding foreign journals, but also the influence of the editorial journal guidelines concerning the internationalization promoted by the editorial journal teams, including the possibility of publishing papers in different language (e.g. in NAER, both in Spanish and English). Another line of research to be further developed is the one that focuses on exploring the arisen themes through content analysis of articles published in specific ET journals (Bond, Zawacki-Richter, & Nichols, 2019; Marín, Duart, Galvis, & Zawacki-Richter, 2018; Marín, Zawacki-Richter, Pérez, & Salinas, 2017; Zawacki-Richter, Alturki, & Aldraiweesh, 2017; Zawacki-Richter & Latchem, 2018; Zawacki-Richter & Naidu, 2016) or a specific field or topic through bibliometric research (Bartolomé, Castañeda, & Adell, 2018; Tibaná-Herrera, Fernández-Bajón, & Moya-Anegón, 2018), and especially emphasising the analysis of shared topics within the Spanish and English ET community to search for a nexus of work together.

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