

Multivariate evaluation of Spanish educational research journals

ANTONIO FERNÁNDEZ-CANO, ÁNGEL BUENO

Facultad de Ciencias de la Educación, Universidad de Granada, Granada (Spain)

This paper informs about an evaluation of Spanish educational research journals using the modality of reputation inferred from survey data. Univariate and multivariate patterns are offered. Specifically cluster analysis and non-parametric multidimensional scaling reveal themselves as useful methods to inquire the complexity of this scientometric question which is the evaluation of periodical series.

Introduction

One in the ways by which the explosion of knowledge announced by *Price*¹ can be clearly manifest is through the publication of scientific journals whose diachronical development also follows the law of logistic growth. The specialization and diversity of scientific disciplines brings about the proliferation of new periodical publications answering the needs of these rising disciplines and defending the interests of the invisible college which stands by them.²

In the case of the Spanish educational research journals, we encounter two additional questions. One, their high number as we found up to 20 national periodical publications³ regularly containing research articles, and consequently, their lack of definition between their scientific or informative character. More than 70 years ago, Rufino Blanco in his *Pedagogic Bibliography Yearbook of 1929* (cited by *Esteban* and *López Martín*⁴) already expressed this solid and up-to-date asseveration:

“... they are very few those [serial publications] which pay *sustained* [italics in the original] attention to the investigations done by scientists and to the bibliographical movement of modern pedagogy.”

The capital question is that “they should be promoted and, mainly, selected our national journals of quality among the great mass of publications that have proliferated in our country in the last few years”.⁵ Nevertheless, a number of previous considerations must be made to this respect:

a) It is not easy to distinguish scientific periodicals that publish mostly reports of empirical research above all from magazines where the aim is the diffusion, newsletters or papers on state-of-art.

b) The range of Spanish educational research journals should and can be studied as a scientometric phenomenon. In a double sense: cross-sectional and, better still if possible, a longitudinal one because such publications are subject to inevitable changes as time goes on.

c) The efforts to achieve comprehensive assessments on this group of publications using the diverse evaluative modalities are scarce, although idiosyncratic studies using the qualitative methods, centred in the historical-social description of people concerned in a single publication are plentiful (i.e., a compilation of related works in *Fernández-Cano and Bueno*^{3,6}).

d) We want comparative evaluations of the diverse scientific journals in the sense that they can serve as referential criteria in order to detect core journals in a disciplinary field of study such as that of the education.

Evaluative modalities

Let us remember that the four more common modalities to appraise scientific serials are those given in the tetrahedron model of Figure 1.

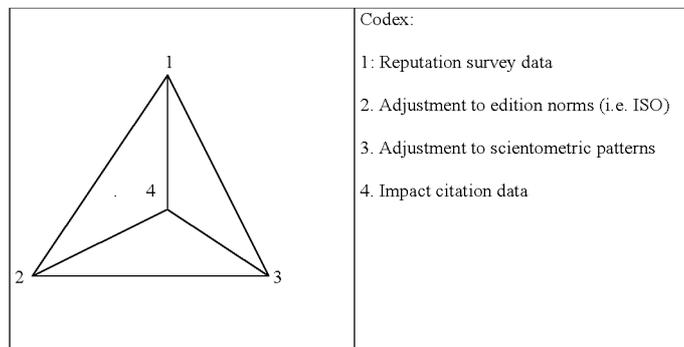


Figure 1. General model for evaluating of scientific journals

- Reputation, as inferred from statistical data obtained through surveys conducted among readers or experts. Their agreement or disagreement on satisfaction allows us to identify the “best” serial publications within a scientific field;

- The adjustment to international standards for the presentation of scientific periodical issued by qualified entities. Some of the organizations which have set up norms are: the International Standardization Organization (or ISO Norms from 1984; a compilation of these norms is published in Ref. 7); UNESCO,⁸ the *International Committee of Medical Journal Editors*,⁹ the Institute for Scientific Information¹⁰ or the *Council of Biology Editors*.¹¹ Fernández-Cano and Bueno¹² developed a checklist and used it for evaluating series of parameters such as information, edition, review and distribution;
- The adjustment to scientometric patterns and laws according to data of productivity; and, especially,
- Evaluations made by citation indicators (i.e. impact factor) just as *Garfield*¹³ has proposed.

Additional data which can be used with evaluative aims are: figures of growth of the journal, access to readers, antiquity or obsolescence, thematic dispersion and specialization, library uses and management such as cancellation, weeding, document delivery or budgeting.

The four previous modalities of the model in Figure 1, with their advantages and limitations are considered as the true operating variables of the construct: "quality of the journal". The discussion on the advantages and limitations of each one of these variables has been an extensive and controversial one. *Garfield*¹⁴ compared prestige versus impact by citation. Since then, the use of citation indicators seems to be well established as the most relevant evaluative modality for the general evaluation of scientific periodicals. The annual rankings published by the Institute for Scientific Information (ISI) have become the basic evaluative underpinning. But in spite of the abundant and heated criticism to the citation analysis as a tool for the evaluation of journals, the *Journal Citation Reports* seem to have become more or less the unmoved and overwhelming criterion for the assessment of journals through their impact factor.

Countless authors question the evaluation by means of impact by citation.¹⁵⁻²¹ Critical remarks go from the inaccuracy of the references, negative or incorrectly attributed citations, lack of consideration of the context in which the citation is generated, abundance of cosmetic citations, a bias against women when they change their surnames, limitations to creativity, a tremendous bias towards English language journals with respect to those in other languages, and so on. A listing of critiques as much to the validity as to the reliability of the evaluation of a journal using citation data is available in Ref. 2, pp. 253-257. However, there is a capital reason for not considering the use of the citation impact as an indicator of the quality of a scientific

journal, such reason is the unavailability or complete absence of citation data for journals from peripheral research systems as in the Spanish case and for “soft” fields as the educational research is.^{6, 22}

The international scientific community has the data supplied by entities such as the ISI and they appear in its periodical repertoires (SCI, SSCI, and AHCI Journals Citation Reports), but none of the educational Spanish journals appear in the ISI’ repertoires. What does one do? Does one not produce any evaluative study about these publications and discard them because they do not appear in the reports of such conspicuous institute? It will be necessary to move on to other evaluative modalities different from the citation impact.

It would be a serious mistake to underrate the scientific publications from peripheral research systems and from multidisciplinary fields as badly looked after as the education field. *Spinak*²³ has pointed out that this type of journals imply a high degree of sociability among their readers; they appreciate the heritage of the common language; they reduce the threats of a sipoy subordination of less developed systems and they also reduce a progressive loss of cultural identity. Finally, national journals point out the relevance and the local priorities of a scientific activity highly contextual as is the educational research. That loophole that the ISI leaves when not considering certain national journals, for marginal, could well be named, using a catholic-theological analogy, the “limbo” of science with its ethereal and irrelevant papers opposite the paradise of ISI with its heavenly privileged publications.

Rationality of the study

This study attempts to evaluate a number of Spanish educational research journals. The term research journal being applied to those which regularly publish research reports, of both theoretical and empiric nature, using the most diverse methodologies. Every research report must include, at least, four basic sections: introduction, method, findings and discussion.

A beneficial aim of this study would be to inform the scientific community formed by those concerned and interested Spanish educational researchers of which are their excellent journals. Consequently to help them choose the best media where their works could be published. It is not taken for granted that the evaluation rates made by a scientific community are in complete agreement with those of particular tribunals or juries.

For example, the evaluation committees proposed by the Department of Education of the Spanish central government, with the objective of evaluating the staff* research productivity, have not emitted any criteria or ranking about the differential quality of the Spanish journals. Therefore, this type of studies, as the one presented here, can supply information to evaluation committees so that they act with an additional basis to their particular specific criteria. At the same time, these works can help consolidate the study of journals as a branch of scientometrics.

Additionally, the evaluation of scientific series can also be useful to agents of scientific information (i.e., booksellers and librarians) in order to give priority to the acquisition and cancellation of titles due to pressing restrictions of financial resources, the increasing price of journal subscriptions, the number of titles available and the proliferation of new publications.

Method

Design

The evaluative modality here used will be the reputation attainable by means of a mail survey sent to members affected and/or interested. This modality should not be underestimated since it is a basic and seminal road to obtain indicators of quality of a scientific journal. On the other hand, we are aware that we should not rely on a single evaluation technique. Not in vain, *Garfield*²⁴ uses profusely, among others, reputation data for selecting the journals to be included in the ISI databases.

Studies of this type are not usual in the field of education. *Mace* and *Warner*²⁵ obtained evaluations of psychology journals, some of them related to the education. In *Luce* and *Johnson's*²⁶ work, American educational and psychological journals were rated. The study of *Nederhof* and *Zwaan*²⁷ can also bear a certain relationship with the subject here enquired since it uses quality judgments as performance indicators in Social Sciences and Humanities. In contrast, *Fraser* and *Gold*²⁸ attempt to explore the factorial structure of the construct "quality of a journal" for periodical publications in Health Education using four variables: reputation, interest, worth and guidance. The general

* Every six years, Spanish researchers working for the national system, can subject to evaluation her/his production in order to obtain an additional sum for productivity (around 100 monthly € euros). If the evaluation is positive, s/he perceives such amount and the recognition of "one approved line". This procedure has had a certain distrust since the approaches and standards for the evaluation of products were not always clear, nor the more prominent journals declared. A single undisputed criterion appears in the sense that at least one of the five representative author's investigations (papers) might be published in a journal appearing in the ISI.

finding from this study and another similar one²⁹ show a low correspondence between the diverse variables which conform conceptually this construct of “journal quality”.

In the Spanish context, we only have two works. *González Rodríguez*'s³⁰ idiosyncratic study uses prestige ratings of the journal *Política Científica* (Scientific Policy). The study of *Toledo et al.*³¹ where a journal evaluation system is described on the basis of the analysis of multiple parameters, historical prestige included, applied to a sample of Spanish journals of economics.

Instrument

Using previously the opinions of three experts, the different journals here included were selected according to their personal criteria and knowledge. The journals must regularly publish research reports. Periodic publications centred in the dissemination, opinion, discussion or representation of syndicate or corporative interests were initially excluded. According to this, a questionnaire compiling 22 scientific journals was drawn to rate by means of an ordinal scale their relative prestige. Briefly, the people interviewed were demanded to give a score from 1 to 12 (from lower to higher reputation) to only twelve journals according to the relative prestige that they estimated for each one. The respondents could complete the listing with some other periodical publications not included in the given list.

Although this ordinal requirement looks simple (the popular top twelve of certain television quiz shows), there were around 10% of returned questionnaires with irregular or wrong ratings (i.e., respondents gave only extreme scores – 1 or 12; others provided monotonic ratings; in some cases fewer than twelve journals were rated perhaps because the respondent did not know the remaining ones sufficiently). Weighted values were then considered. The answering scale here adopted “the top twelve” because there was no security that most of the interviewed people knew in depth all the available journals. An indicator of validity (clue) was introduced by way of a distractor including a nonexistant journal (*BEI*: Bulletin of Innovative Education). This “false hint” was detected because it was rated almost null.

We must acknowledge that the correspondence between perceived prestige of a journal with its quality is an oversimplified and limited isomorphism. The prestige is manifested by multiple operational definitions: influence, importance, relevance, significance, historical prestige, editorial prestige, and perceived value. This is then a typical limitation of this kind of studies.

Table 1 shows the layout of the question inserted in a wider questionnaire sent by mail during the second semester of 2000.

Table 1. Listing of Spanish educational journals submitted to evaluation

Rate only twelve of the following journal from the field of the education according to the scientific prestige that you estimate they have at the present time. So that of more prestige assigns him a value 12 and to the one of smaller 1:

___ <i>Anales de Pedagogía</i> [AP]	• Annals of Pedagogy
___ <i>Aula de Innovación Educativa</i> [AIE]	• Classroom of Educational Innovation
___ <i>Aula Didáctica</i> [AD]	• Didactic Classroom
___ <i>Boletín de Educación Innovadora</i> [BEIi]	• Bulletin of Innovative Education
___ <i>Bordón. Revista de Pedagogía</i> [BOR]	• Bordón. Review of Pedagogy
___ <i>Cuadernos de Pedagogía</i> [CP]	• Notebooks of Pedagogy
___ <i>Enseñanza de las Ciencias</i> [EC]	• Science Teaching
___ <i>Infancia y Aprendizaje</i> [IA]	• Childhood and Learning
___ <i>Investigación en la Escuela</i> [IE]	• Research in the School
___ <i>Perspectivas Pedagógicas</i> [PP]	• Pedagogical Prospects
___ <i>Revista Complutense de Educación</i> [RCE]	• Complutensis Journal of Education
___ <i>Revista de Ciencias de la Educación</i> [RCCE]	• Journal of Educational Sciences
___ <i>Revista Educación de la Universidad de Granada</i> [REUG]	• Educational Journal of Granada University
___ <i>Revista de Educación Especial</i> [REE]	• Journal of Special Education
___ <i>Revista de Educación</i> [RE]	• Review of Education
___ <i>Revista de Historia Educación</i> [RHE]	• History of Education Journal
___ <i>Revista de Investigación Educativa</i> [RIE]	• Journal of Education Research
___ <i>Revista Interuniversitaria de Formación del Profesorado</i> [RIFP]	• Interuniversity Journal for Teacher Training
___ <i>Revista de Orientación Educativa y Vocacional</i> [ROEV]	• Journal of Vocational and Educational Counselling
___ <i>Revista Española de Pedagogía</i> [REP]	• Spanish Journal of Pedagogy
___ <i>Revista Pedagógica</i> [RP]	• Pedagogical Review
___ <i>Studia Pædagogica</i> [SP]	• Studia Pædagogica
___ <i>Otras (relacionar)</i> _____	• Others (relate them)

Sample and population

The target sample is the whole population of members of a Spanish university association working in pedagogical research, namely the Asociación Interuniversitaria de Investigación Pedagógica (in short, from now, AIDIPE). This population was accessible through the directory contributed by the managing committee of this association. The members being educational researchers from the majority of Spanish universities initially trained as pedagogues and with a strong experimental tradition. Generically this community could be well qualified as “empiric pedagogues” with an additional concern for methodological and counselling questions.

Therefore, this study is a census with a response rate of completed questionnaires of about 35 % (112 respondents from a population of 323). This figure can be considered high enough for the generalization of evaluative results to only AIDIPE members.

Results

Univariate evaluation

An ordinal list of appraised journals is offered in Table 2 jointly with the additional statistical scores: range (r^o); arithmetic mean (\bar{X}); standard deviation (s); standard error of the mean (s_x), variation coefficient (C.V.) and sample percentage of respondents who do not emit a rating of each journal (%).

Another four supplementary journals, pointed out by the respondents, collect marginal means ($X < 1.00$), very similar to the last one of this list [the non-existent *BEI*].

Table 2. Sample statistics on evaluation by reputation of Spanish educational journals

Rank	Journal	X	S	s_x	C.V.	%
1	<i>RIE</i> Revista de Investigación Educativa	7.76	4.42	0.41	0.57	17.0
2	<i>BOR</i> Bordón	7.03	4.11	0.38	0.58	16.1
3	<i>RE</i> Revista de Educación	5.85	4.92	0.46	0.84	32.1
4	<i>IA</i> Infancia y Aprendizaje	5.69	4.27	0.40	0.75	26.8
5	<i>REP</i> Revista Española de Pedagogía	5.27	4.50	0.42	0.85	32.1
6	<i>CP</i> Cuadernos de Pedagogía	4.25	3.80	0.35	0.89	27.7
7	<i>RCCE</i> Revista de Ciencias de la Educación	3.82	3.75	0.35	0.98	40.2
8	<i>ROEP</i> Revista de Orientación Educativa y ..	3.51	3.74	0.31	1.25	52.7
9	<i>RIFP</i> Revista Interuniversitaria de ...	2.68	3.37	0.31	1.25	52.7
10	<i>REE</i> Revista de Educación Especial	2.62	3.55	0.33	1.35	55.4
11	<i>PP</i> Perspectivas Pedagógicas	1.97	3.34	0.31	1.69	67.9
12	<i>AIE</i> Aula de Innovación Educativa	1.60	2.96	0.28	1.81	67.0
13	<i>SP</i> Studia Pædagogica	1.52	2.87	0.27	1.88	70.5
14	<i>IE</i> Investigación en la Escuela	1.50	2.79	0.26	1.86	68.7
15	<i>EC</i> Enseñanza de las Ciencias	1.27	2.88	0.27	2.26	79.5
16	<i>RCE</i> Revista Complutense de Educación	1.23	2.76	0.26	2.24	79.5
17	<i>AP</i> Anales de Pedagogía	1.00	2.39	0.22	2.37	78.6
18	<i>RHE</i> Revista de Historia de la Educación	0.99	2.48	0.23	2.51	81.2
19	<i>RP</i> Revista Pedagógica	0.90	2.47	0.23	2.27	83.9
20	<i>REUG</i> Revista Educación Udad. Granada	0.87	2.45	0.23	2.80	84.8
21	<i>AD</i> Aula Didáctica	0.62	1.88	0.17	3.01	83.9
22	<i>BEI</i> Boletín de Educación Innovadora	0.25	1.27	0.16	4.5	92.9

We can observe a consistent evaluative pattern of periodical publications in the sense given by the variation coefficients; a quite simple index but significant about its evaluative validity. Likewise, the evident high correlations between distributions of means, standards deviations, standard errors of the mean, variation coefficients and sample percentages provide evidence about the congruence of the univariate evaluation of these journals. Additional reliability coefficients of internal consistency for the various distributions, at the level of direct data, or even between derived statistics, reinforce the validity of the evaluation obtained (averaged Carmines' $\theta = 0.80$).

It is evident that *RIE*, official publication of the association surveyed (AIDIPE) obtains the highest rate but very close to its associated journal (*BOR*); in fact *RIE* was a twin product from *BOR* occurring in 1983. *RE*, *IA*, and *REP* constitute a triad of highly regarded journals. *CP* as a publication concerned with the diffusion and dissemination of research reaches an excellent sixth position. *RCCE*, *ROEP*, *RIFP* and *REE* conform to the above ones the nucleus of the top ten more valued Spanish educational journals.

Pattern of multivariate evaluation: Applying cluster analysis

Cluster analysis has been used in the evaluation of scientific publications but with citation data.^{32,33} Here, a matrix of 22 cases (journals) \times 112 variables (raters) is subject to cluster analysis in which grouping variables are the distributions of raters surveyed. The obtained solution using the algorithm of complete linkage offers an outstanding result shown in Figure 2.

As an attempt to interpret the tree diagram obtained, we can consider the following clusters:

Cluster1: conformed by the journals that receive the highest rates (*REP*, *RE*, *IA*, *RIE* and *BOR*). It can be seen that *RIE* and *BOR* emerge as close pair, which together with *IA* conform the trio of journals with a high empiric orientation. On the other side, *REP* and *RE* are journals more centred in theoretical matters, discussions about normative foundation, or policy analysis with a humanist methodology. This nuclear cluster could well be named "basic scientific journals of the Spanish educational research system", and it is focused above all in basic or applied research as its main function.

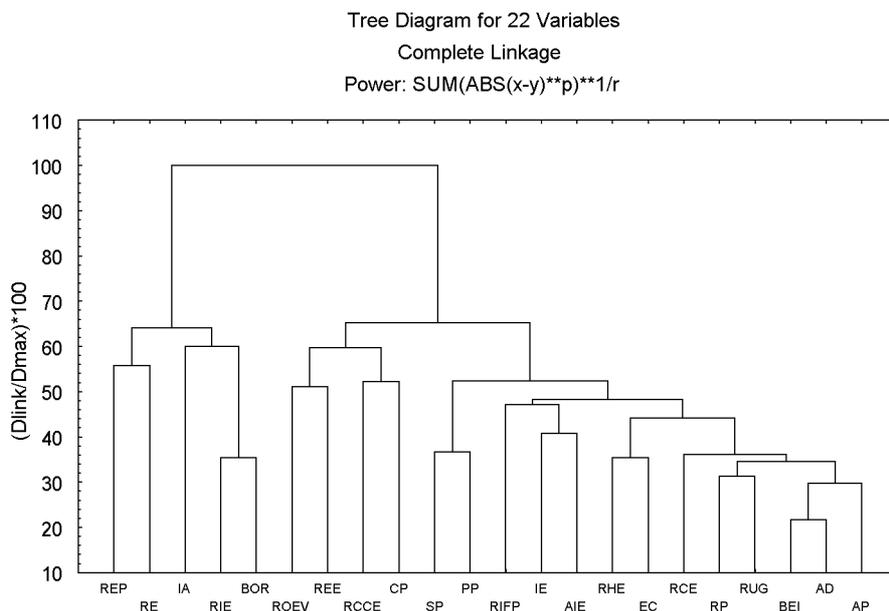


Figure 2. Tree diagram of clusters analysis (journals x raters) by complete linkage algorithm

Cluster 2: In this one, we can distinguish two well-differentiated subclusters respectively:

- *Cluster 2-1:* conformed by the journals *ROEV*, *REE*, *RCCE* and *CP*. The two first ones have as a similarity a concern for the students with special educational needs. An odd case is the couple made up by *RCCE* and *CP*: both of them are publications concentrated in the diffusion and dissemination but with a strong ideological antagonism. *RCCE* is a Catholic conservative document. Whereas *CP* is initially a monthly magazine, that appeared after the fall of general Franco's dictatorship, with a clearly leftist political orientation in the line of *Boletín de la Institución Libre de Enseñanza (BILE; Bulletin of the Free Teaching Institution*)*. This cluster could be denominated as "secondary journals of the Spanish educational system"; publications more centred in tasks of diffusion and dissemination.

* *BILE* was the official publication of the Institucion Libre de Enseñanza (Free Teaching Institution), a liberal progressive initiative opposite to the traditional Catholic educational establishment in Spain. *BILE* and all its centers were strictly banned as a reprisal by general Franco's regime after the Spanish civil war, in 1939.

It seems strange the fact that *RIFP* is not present in this cluster with similar ratings as the remaining journals which are included in this cluster. The reason for such absence could be that *RIFP* would only be in the interest of a limited number of respondents, only those concerned with the training of primary school teachers.

- *Cluster 2-2*: consisting of the remaining journals, without a special interest for the respondents. This cluster could be denominated “marginal or irrelevant journals”, although it includes publications of intrinsic quality and high interest for other educational communities; for example *EC*, for the scientific-mathematical educators.

The general finding from this cluster analysis exposes the existence of two well-differentiated journal groups. Conclusion in consonance with the proposals that *Price*³⁴ made in 1961 when he distinguished two types of scientific periodical publication: the strictly scientific ones and those with some scientific content.

Multivariate pattern of evaluation: Multidimensional scaling

The previous matrix is subject to multidimensional scaling. Multidimensional scaling is a multivariate method that operates with multiple dimensions, in our survey the ratings given by the respondents to various products or items, in this case, journals. It tries to detect underlying significant dimensions, which can explain similarities (distances), between the items appraised. Here, a non-metric solution has been applied as it demands fewer assumptions to verify; concretely, the ordinal approach devised by *Shephard*³⁵ and improved by *Kruskal*³⁶. After applying to the matrix, conformed by 22 items (journals) \times 112 variables (ratings), an algorithm of D-star distances contained in the Multidimensional Scaling (MDS) program of the Statistica package³⁷ gives, the numeric solution whose stress is minimum ($s = 0.067$) and, the graphic solution shown in Figure 3.

The two-dimensional representation of multidimensional scaling is usually interpreted as that of factorial analysis. In this sense, we observe that:

Dimension 1 (horizontal) could well be denominated: scientific quality of the rated journals. In this dimension, the average rates of prestige of each journal emitted by that sample fall down, though only with small variations for the journals of cluster 2-1.

Dimension 2 (vertical) is less interpretable but it could be labelled as academic-institutional pedagogic status. Because it fluctuates from the eminently most official journals (*RE* and *REP*) to the less official ones (*CP* and *IA*), either because of their general content and/or their belonging to non-pedagogical groups (e.g., psychologists).

up with the secular and deep-rooted humanist tradition customary in Spain for the study of educational phenomena. Both journals are a good example of the empirical trend, methodologically quantitative, in the Spanish educational research.

RE is an official publication of the Central Ministry of Education and Culture. *IA* represents the community of Spanish educational psychologists. It is also a publication with a strong quantitative empiricism tendency; in fact, it would be acknowledged as the antagonistic of *RIE* with quite a few common interests and sometimes clearly opposed to those of the community of empiric pedagogues grouped around *RIE* and *BOR*. *REP* is an advanced scientific publication of general character founded and subsidized, until 1988, by the CSIC also dependent of the Central Ministry of Education. For some time, *REP* was claimed to be the most “scientific” publication in the field of Spanish education.

In contrast with *REP*, *CP* has a more popular character and aims because it is marketed as a monthly magazine so it enjoys a wide distribution among progressive educators (teachers outside academia).

RCCE is a confessional publication of Catholic allegiance. It takes over from the oldest educational journal in Spain, the hundred-year-old *Revista Calasancia* (Calasance Review) founded and published under the auspices of the Catholic Piarist Schools Order (the Scuole Pie) from the end of XIX century.

RIFP is the offspring of an old journal (*Revista de Normales*: Review of Normal Schools) founded in the 1920s as the organ of the old Normal Schools devoted to the training of primary teachers following in some way the French pattern. These Normal Schools were assimilated to the Spanish university by the middle of the 1970s.

The last two publications of this top ten ranking are: *REE* and *ROEV*, published by the educational section of the Universidad Española de Educación a Distancia (Spanish Open University). Both also have a certain relationship with the AIDIPE association. In as much as, *ROEV* is the official organ of the Spanish educational counselling community, whereas *REE* is the publication of researchers who work in Special Education with all kinds of students handicapped by special educational needs. Those two professional groups have a wide representation in AIDIPE.

An aspect to highlight is *SP* (former *Patio de Escuelas*: School Courtyard), it reaches a considerable mark for a *dead* journal since it has not been published for more than eight years. Although according to its editors, scholars from Salamanca university (personal communication), it is “hibernating”.

Conclusions

This kind of studies can help explain the phenomenon of specialization and diversification in scientific disciplines and/or to enlighten the interests of the invisible college which supports those publications.² Furthermore, we are in a position to ascertain that the subject of the scientific publication is approachable by means of scientific inquiry, far from the traditional idiosyncratic method.

We have also verified the existence of a few basic journals for a scientific community. However, a consideration must be made about these appraisals: its definite bias, naturally towards those journals more professionally related. Therefore, studies of this type should open up to a wider sample represented by strata of the different educational tendencies, with professional and research interests divergent.

In this way, another suggestion for further research that might be conducted in the future, would be to inquire the factorial structure of the construct offered in Figure 1, because there is no evidence of correlation between the diverse operations of the journal quality.

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Address for correspondence:

ANTONIO FERNÁNDEZ-CANO
Facultad de Ciencias de la Educación
Campus de Cartuja, Granada, 18071, Spain
E-mail: afcano@ugr.es