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Radiography of a decade of
Spanish educational scientific journals
(2011 - 2020)

Policy Building and Generation of
Knowledge in Education

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Radiography of a decade of Spanish educational scientific journals (2011 - 2020)

Radiografía de una década de revistas científicas de educación españolas (2011 – 2020)

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Abstract

Spanish scientific journals on education have shown an extraordinary evolution in recent decades, which has been consolidated since the 1980s with the exponential growth of these publications. Since the University Reform Law (LRU, 1983), the evaluation of research through published scientific production has become the reference for the professional development of university teaching and research staff, with research merits being measured based on the impact of articles published in indexed scientific journals, mainly in the two international reference databases: Social Science Citation Index (WoS) and Scopus (Elsevier).

This article aims to analyze the evolution of Spanish scientific journals on education based on several indicators: impact and indexing, international collaboration, distribution by year, language, subject, authors' origin, funding, descriptors, and citation. Using a descriptive methodology, these indicators are analyzed for the eight indexed Spanish scientific journals only in the 'Education' category by the Scimago Journal Rank of Scopus with permanence from 2011 to 2020. The results show an upward evolution of the impact, measured in citations and the indexation of the journals under study. The increase in international collaboration stands out, especially between Latin American countries, with a more significant presence of articles in English. Regarding the content reflected in keywords, topics such as inclusion, citizenship and coexistence, educational assessment and school results, competencies, teacher training, and educational technology stand out, based on contextualized research mainly in higher and secondary education. On the other hand, there is a high frequency of keywords that are too generic and do not clearly identify the research they represent. These results raise several challenges that Spanish scientific journals in education will face in the immediate future.

Keywords: scholarly publishing; educational research; scientific communication; research visibility; academic productivity, research impact.

Resumen

Las revistas científicas de educación españolas han mostrado en las últimas décadas una evolución extraordinaria, que se consolida a partir de la década de los 80 con un crecimiento exponencial de estas publicaciones. A partir de la Ley de Reforma Universitaria (LRU, 1983), la evaluación de la investigación a través de la producción científica publicada se convirtió en la referencia para el desarrollo profesional del personal docente e investigador universitario, midiéndose los méritos de investigación a partir del impacto de artículos publicados en revistas científicas indexadas fundamentalmente en las dos bases de datos internacionales de referencia: *Social Science Citation Index* (WoS) y *Scopus*. El objetivo de este artículo es analizar la evolución de las revistas científicas de educación españolas durante una década significativa a partir de varios indicadores: impacto e indexación, colaboración internacional, distribución por años, idioma, tema, procedencia de autores, financiación, descriptores y citación. Con una metodología descriptiva, se analizan estos indicadores para las 8 revistas científicas españolas indexadas únicamente en la categoría 'Education' del *Scimago Journal Rank* de Scopus con permanencia desde 2011 al 2020. Los resultados muestran una evolución ascendente del impacto, medido en citas, y de la indexación de las revistas objeto de estudio. Destaca el aumento de la colaboración internacional, especialmente entre países de Iberoamérica, junto a una mayor presencia de artículos en inglés. En cuanto al contenido reflejado en las

palabras clave, destacan temas como inclusión, ciudadanía y convivencia, evaluación educativa y resultados escolares, competencias, formación del profesorado y tecnología educativa, a partir de investigaciones contextualizadas principalmente en la educación superior y en la secundaria. Se evidencia una importante frecuencia de palabras clave demasiado genéricas, que no identifican bien las investigaciones que representan. Estos resultados plantean diversos retos a los que deberán enfrentarse en el futuro inmediato las revistas científicas de educación españolas.

Palabras clave: publicación científica; investigación educativa; comunicación científica; visibilidad de la investigación; productividad académica; impacto.

Introduction

The generation of knowledge in education inevitably relates to the efforts made throughout history to delve deeper into the educational experience, systematise it, understand it better, generate evidence about it and advance in the creation of a scientific corpus on the relevant educational problems. In other words, the generation of knowledge relates to the rigorous research and analysis of innovation. To this end, the dissemination of these findings through the publication of monographs, articles in scientific journals, edited technical reports, congresses, as well as informative publications in the press, in professional journals and in digital resources is key. Researchers have experienced how this ecosystem of scientific communication has been increasingly gaining more relevance, not only in terms of the rapid development of science but also about the impact that different channels have on their own recognition and professional development. Thus, scientific journals have become the main communication channel for research, which is mostly due to the evaluation policies and the recognition of research, as well as the scientific output of institutions and their researchers (Alperin & Rozemblum, 2017).

In this context, it is worth posing questions on the state of scientific production in the field of education in our country, Spain: Has the dissemination of knowledge been shaped by international and national science policies in recent decades? What role have scientometrics, the large editorial groups with international influence and the so-called "hard" science paradigm played? What effects has all this had on the production and professional development of researchers? Has there been a response

to the dynamics and demands of scientific dissemination? It is relevant to consider this set of questions in order to be able to understand the evolution of scientific communication in Spain in general and, especially, the evolution of scientific journals in education. The introduction of this work provides some data on the questions posed above, which provide the context for this paper, whose general objective is to analyse the evolution of scientific journals in education in a key decade. In greater depth, the 8 journals that have remained the longest in the *Scimago Journal Rank (SJR)* by Scopus for the period 2011 - 2020 are analysed on the basis of a set of indicators.

The evolution of Spanish science policy and its influence on the generation of scientific knowledge in education

Scientific production has been connected to university institutions, through which, for centuries, scientific societies have been created to promote areas of knowledge and projects, obtain resources and debate and disseminate their advances in recognised journals. Examples of this are the *Deutsche Akademie der Naturforscher – Leopoldina* (1652), the *Royal Society* in London (1660) and the *Académie des Sciences* in France (1666). These institutions promoted the first scientific journals, which are similar to current-day ones, but with much less dissemination (Ruiz-Corbella, Galán & Diestro, 2014). It was not until the end of the 19th century and the beginning of the 20th that there began to be an expansion of universities, institutes and scientific societies with the objective of identifying and responding to new problems, demands and social challenges. At the same time, governments began to promote and recognise the relevance of science for development, which, in Spain, happened through the creation of the *Junta para Ampliación de Estudios e Investigaciones Científicas (JAE)* in 1907, which was chaired by Santiago Ramón y Cajal. This institution developed the first authentic “science policy” by promoting an extensive and varied activity that boosted research in Spain in the first third of the 20th century (Bernal & López, 2007). Linked to this movement are the *Boletín de la Institución Libre de Enseñanza* (1877 – 1936) and the *Revista de Pedagogía* (1922-1936), with both being references in the dissemination of pedagogical science based on and connected with the pedagogical renewal movements outside the country

(Mérida & Gamarro, 1992). As a result, Spain began to take note of the importance of science policy. In the words of Aguirre, “one of the greatest institutional discoveries of modern states, an essential part of general policy, as important as economic, educational, international or defence policy” (Aguirre et al., 1980, n.p.).

Continuing with this succession of reaching milestones in scientific policy that have affected science in education, the creation of the *Spanish National Research Council (CSIC)* in 1939 (a continuation of the *IAE*) stands out for being a driver for science policy based on European models. The *Instituto San José de Calasanz de Pedagogía*, which focused its activity on the research of educational themes and training, became part of the CSIC. This institute carried out its activity in close relationship with the Chair of Pedagogy at the Complutense University of Madrid, which promoted the creation of the *Revista Española de Pedagogía* (1943). Two years prior, the Ministry of National Education had created the *Revista Nacional de Educación*, whose name was changed in 1952 to *Revista de Educación* and has remained to be so until today (Vilanou et al., 2017). The journal is currently publishing its 400th issue in commemoration of this monograph. The *Sociedad Española de Pedagogía* (1949) was also linked to the above-mentioned institute and aimed to bring together professionals from the world of education. In this same year, it began to publish its journal, *Bordón. Revista de Pedagogía*, with the aim of allowing all specialities in which research is produced to exchange experiences and share perspectives.

In line with the growing importance that the State Administration was giving to research, the Ministry of National Education was renamed the Ministry of Education and Science in 1966. Regardless of where science was situated in the administrative structure, the important fact is that science and technology policy was consolidated as a state policy, which included the policies which were established by the Autonomous Communities after their creation. As such, in the 70s, the first national plans for the development of research projects were established. However, the fundamental milestone was the enactment of the Spanish Constitution (1978), which includes “the right to literary, artistic, scientific and technical production and creation” (Art. 20.b) and established in Article 44 that “The public authorities shall promote science and scientific and technical research for the benefit of the general interest”, which resulted in significant progress in the orientation and provision of science policy.

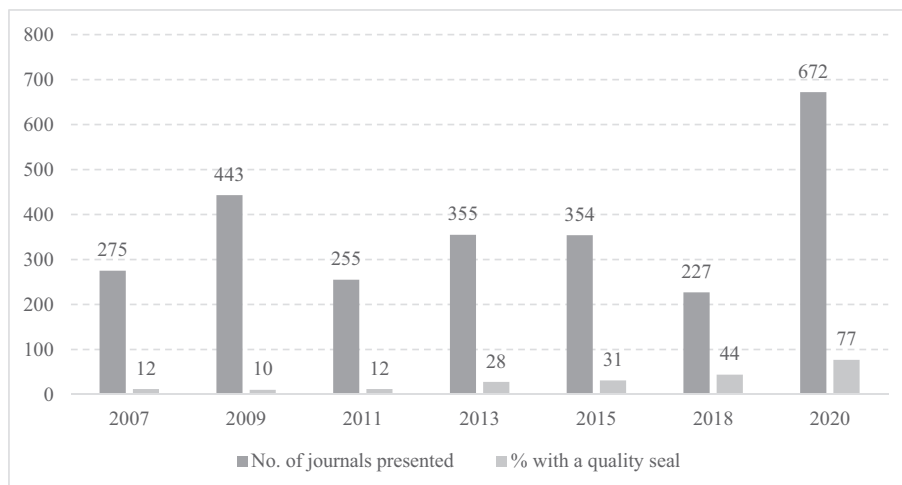
In 1983, the Ministry of Education and Science created the *Centre for Educational Research and Documentation (CIDE)* [successor to the *National Institute of Education Sciences (INCIE 1978- 1982, formerly the National Research Centre for the Development of Education (CENIDE)*], promoting and managing different actions such as the National Prizes for research and innovation, having recognised results in terms of knowledge transfer to the education system and creating a foundation on which to develop consolidated research lines and groups.

In 1986, in accordance with the Articles established in the Spanish Constitution (1978), the first *Law for the Promotion and General Coordination of Scientific and Technical Research* was approved, which definitively positioned science on the Spanish political agenda, establishing the foundations for the promotion, management and funding of national research plans and their coordination between the State and the Autonomous Communities. One year later (1987), the Ministry of Education and Science created the *Interministerial Science and Technology Commission*, which played a significant role in the intersectoral approach to research activity. The above- mentioned law was followed by other laws and new bodies and agencies were created to promote, fund, and evaluate it.

In this context, the Ministry of Science and Innovation created the *Spanish Foundation for Science and Technology (FECYT)* in 2001, whose objective was to link science and society and promote the Spanish scientific culture and the transfer of knowledge. From the different actions carried out, the support for the professionalisation and internationalisation of Spanish scientific journals stands out. Thus, since 2005, it has been promoting the recognition of journals that follow international quality criteria. To this end, the *ARCE Programme* was launched in 2007 through the *Call for the Evaluation of the Editorial and Scientific Quality of Spanish Scientific Journals*, which periodically awards the *FECYT Quality Seal* in recognition of editorial and scientific quality, celebrating its 8th edition in 2022. There has been great effort made by the editorial teams to achieve the standards and this has increasingly resulted in successive calls for proposals (Figure I).

The European Union's successive multiannual framework programmes for research and innovation have led to unprecedented progress in the funding and internationalisation of research in general and also progress in educational research in particular in Spain, occasionally compensating for budget reductions or preventing the suspension of projects in periods of crisis in the national economy.

FIGURE I. Data for the scientific journals submitted to the calls for proposals Evaluation of the Editorial and Scientific Quality of Spanish Scientific Journals, 2007 – 2020, FECYT.



Note: Own contribution from the FECYT (2022).

The role of scientometrics, editorial groups and the “hard” science paradigm

The analysis of the Spanish scientific production collected on the *Web of Science (WoS)* for the period between 2011-2020, shows that the field of Social and Legal Sciences contributes 23.08%, compared to Experimental Sciences or Medicine, which double or triple this proportion. However, the behaviour of this area in the same decade shows a slow and sustained increase over time. Another interesting aspect is the emergence of the *Emerging Sources Citation Index (ESCI)* by the WoS, which is a database without an impact factor, in which the presence of Spanish journals in Social Sciences and Law skyrocketed. In 2020, it represented 47.96% of all Spanish journals in this field (IUNE Observatory, 2022), with the opposite happening in the *Social Science Citation Index (SSCI)*, where there is a low representation of Spanish journals. In this context, the ESCI is a way to alleviate the deficient coverage of national journals, which present significant (emerging) scientific trends and progress. This

makes them eligible to be indexed in the *SSCI* or in *Arts & Humanities (AHCI)* (Ruiz- Pérez & Jiménez-Contreras, 2020). This theoretical functioning of the *ESCI* as a “journal incubator” was well received by the scientific community, despite not having, as was expected, been able to include journals in the *premium* collections.

This situation has meant that Spanish scientific education journals have seen an unprecedented evolution in the past twenty years. Firstly, they adopted the necessary formal and technical indicators (which were more focused on the form than on the content) typical of international scientific journals (Diestro et al., 2017). Secondly, complete attention was given to the impact, rather than other ways of assessing quality, thus responding to the criteria for assessing scientific productivity emanating from the CNEAI (ANECA) and the systems of recruitment and promotion of teaching staff. In short, the impact factor became the cornerstone of the science evaluation system (Delgado López-Cózar, 2017).

We are still far from having other national (Dialnet Metrics, MIAR or the FECYT Quality Seal) or international (Google Scholar Metrics or the new almetrics) metrics that are recognised at the same level as the “big two” databases, to obtain a positive evaluation for research period applications or accreditations. In turn, *Clarivate Analytics* developed the *Journal Citation Indicator (JCI)*, which includes the *ESCI* and *AHCI*, introducing another wider metric that complements its famous *JIF* impact indicator. *SCOPUS* created *CiteScore*, which is easier to calculate and is more regularly updated than the *SJR*. In short, it is a true spiral of metrics that generate different ways of measuring the same reality: the impact of research. However, the criticism about the use of these rankings for the evaluation of researchers is increasing, as indicated in the *DORA* statement.

The effects of Spanish scientific and university policy on the production and dissemination of knowledge and in the professional development of researchers

The *University Reform Act (LRU, 1983)* expressly recognised research as one of the key functions of university professors, considering for the first time its evaluation as a necessary link in the process of managing scientific activity (Cabezas-Clavijo & Torres-Salinas, 2014). From this point

onwards, the evaluation and recognition of university professors were centred primarily on the assessment of their scientific production, while teaching was consigned to second place, with well-known consequences. The evaluation and remuneration of individual scientific production were regulated by Royal Decree 1086/1989 (Art. 4.1), with this being the precursor of the current research periods or six-year periods established in the Order of 2 December 1994. The evaluation was managed by the *National Commission for the Evaluation of Research Activity (CNEAI, 1989)*, an entity that, in 2015, was integrated into the *National Agency for Quality Assessment and Accreditation (ANECA)*. In short, the five best research contributions published over a period of six years by the person applying were evaluated. While initially the evaluation was created as a support for individual productivity, with the successive regulatory development, it has become an essential tool for the professional development of academics, given that the six-year period,

... entails benefits such as career advancement, access to positions of power and resources for research. However, it should be noted that the six-year periods do not measure excellence, but rather only research sufficiency. Mangas Martín (2011) states that the accumulation of the maximum number of periods should not be considered an indication of excellence, but rather, at most, it is an indicator of perseverance (Cabezas-Clavijo & Torres-Salinas, 2014, p. 15).

In accordance with these authors, in a first stage (1989-1995), the evaluation criteria for the research results were limited to generic guidelines: publications in books, articles or technical reports, among others, were considered valid contributions, without specifying their inclusion in databases or publication rankings. In a second stage, from 1996 to the present day, the increasingly exhaustive regulation of quality criteria in each field of knowledge began. Specifically, “Education” was included in “Field 7 - Social, Political, Behavioural and Education Sciences”, which consisted of a broad spectrum of knowledge areas. In this context, the Resolution of 25 October 2005 was published, which specified the criteria for recognising the quality of research contributions, outlining that only research articles would be evaluated and there would only be consideration of their inclusion in the two citation indexes (*Social Science Citation Index* and *Science Citation Index*), whose tool for calculating impact is the *Journal Citation Reports (JCR)*, which is a reference for

measuring the quality of journals. The first direct reference to the field of “Education Sciences” appears in this Resolution.

The university community, especially in the field of social and legal sciences and, within this, in the field of education sciences, has been critical of the criteria required for the positive evaluation of research activity, both for its insufficient objectivity and transparency and for not responding differentially to the context of each field of knowledge, especially in broad fields such as the one that included education sciences (Field 7):

It is shown that the criteria are not particularly specific and there is no objective scale that can be referenced when evaluating the merits provided by the applicants. This situation leads to an enormous failure rate in absolute terms and in comparison with other areas (Galán & Zych, 2011).

The Resolution of 14 November 2018 brought with it a new subfield 7.2, with more clearly defined criteria and its own evaluation committee for education.

This economic productivity incentive progressively became a key indicator for the professional development of university professors (affecting academic career progression or limiting the teaching load of productive researchers, among others). Moreover, the decision to prioritise the scientific articles indexed in exclusive international databases determined both the content and methodologies of the research and the form of publication. Although initially, for the awarding of a six-year period, articles from journals indexed in different national and international databases were valued, these journals must now be included in one of the databases from which the reference impact indices are calculated: *Clarivate Analytics' Journal Citation Reports (WoS)* and *Elsevier's Scimago Journal Rank (SCOPUS)*. Likewise, the indexing demand has increased over the years in such a way that the contributions must be published in journals positioned in the first or second quartile of the aforementioned databases, the result of which has led quantitative objectivity to become the reference for evaluation (Cabezas-Clavijo & Torres-Salinas, 2014).

The evaluation and its criteria have undoubtedly managed to orientate and increase scientific production and the internationalisation of Spanish research, with there being a greater presence in international databases and, of course, they have also resulted in an enormous effort being made to improve Spanish scientific journals in education. However, this evalu-

ation policy has also had a negative effect on the overall recognition of the work of university professors as prestigious national databases have not been considered or have ceased to exist due to a lack of funding, or because the Quality Seal awarded by the *FECYT* has not been sufficiently valued, not to mention the comparatively lower impact for the professional development of other important tasks such as disciplinary study, teaching and academic management (Torrado & Duque-Galvache, 2023).

This situation has led to there being an obsession from the beginning of an individual's academic career to publish solely and quickly in the type of journals that ensure professional promotion, such as those indexed in the first quartiles (Repiso, Merino-Arribas & Cabezas-Clavijo, 2021), which in turn has led to an increase in malpractice. We are referring to relegating the creation of teaching resources, yielding to topics and research methods that are prioritised in certain journals with the resulting disregard for problems and methodologies that are relevant to research in education and in the Spanish context, even accepting the "economic tax" of certain well-indexed journals to accept manuscripts. In short, these are practices that are derived from policies that erroneously make significant inferences, in which the quality of an article is assumed almost exclusively on the basis of the journal that publishes it, which is not always a correct assumption, as can be seen further in this present study with the number of citations received by some articles or their transfer. In other words, this logic results in a greater value being put on the form rather than the content, since the evaluation is centred on the journal rather than on the article itself, which happens due to trust being placed in peer reviews, in journal indexing procedures, in the editorial policy of the journals and in the ethical behaviour of all the agents involved, although this trust is not shared by all.

“When medium (publishing) becomes an end in itself, when research is considered to be publishing, it is normal that individuals end up publishing for the sake of publishing..., or they suffer for the sake of publishing, which is much worse given all the undesirable effects that this culture entails” (Delgado López-Cozar & Martín-Martín, 2022, pp. 24-25).

In this line, and irrespective of what is regulated in other fields, it must be recognised that the *Draft Law on the University System (LOSU, 2022)* attempts to foresee and correct these biases to begin to evaluate databases

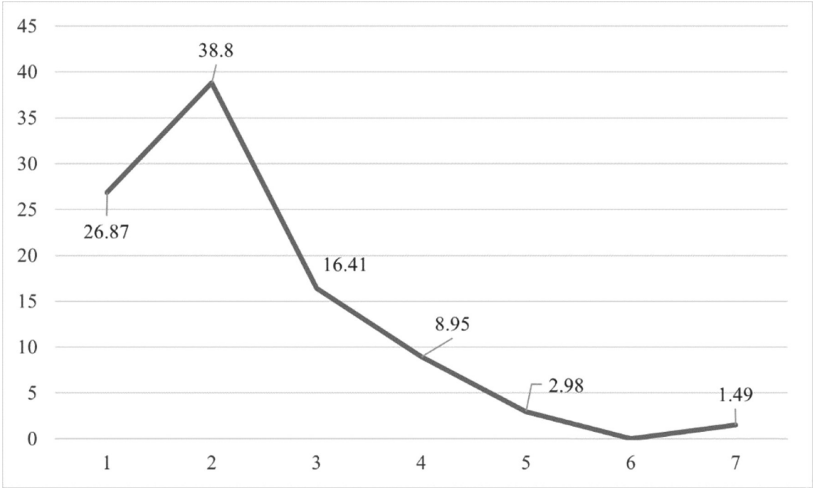
specific to the Spanish science system, identify quality indicators for the content of the published articles and highlight the importance of knowledge transfer in scientific production. Moreover, it is only fair to recognise the significant and effective effort that the editorial teams of Spanish scientific journals in education made over the years to achieve the quality indicators required and select the most specialised reviewers, which has led to, despite the scarce human and financial resources, an increase of interest for the context and their competitiveness in the national and international context and being indexed in the most recognised databases.

Scientific journals in education in the Spanish context

A particular characteristic of scientific journals in the field of education is diversity in the areas which constitute it. An example of this is the fact that many journals include, as part of their field of study, disciplines from other fields. As such, using the 2020 list of Spanish education journals positioned in the Scimago SJR ranking as a reference, the 'Education' area includes publications that share this field of education with other thematic areas, such as *Arts and Humanities*, *Business*, *Computer Science*, *Health Professions*, *Mathematics*, *Medicine*, *Psychology* and *Social Sciences*. Of the 67 Spanish journals indexed in 2020, only 26.87% adhere exclusively to the 'Education' category, while the remaining 73.13% incorporate 2 or more categories (Figure II). These data show the thematic dispersion or breadth of education journals, showing the complexity, complementarity, and richness of the education sciences. There are specific journals pertaining to the field of education, however, many others share it as a secondary category. Examples of this diversity can be seen with titles such as *Monografías de Traducción e Interpretación*, *Intangible Capital*, *Revista Internacional de Estudios Ingleses* and *Siglo Cero*, all of which are indexed in the *Education* category in SCOPUS but have their main area of knowledge in Literature, Economics, English Philology or Intellectual Disability. This dispersion has led us to focus our analysis on the journals that are declared as exclusively being in the 'Education' category in selective international databases.

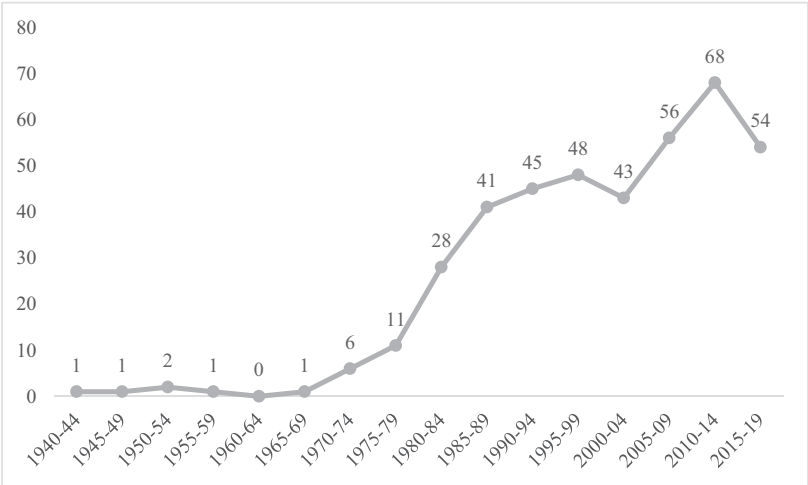
As shown in Figure III, the emergence of Spanish scientific journals in education began in 1980. Scientific production in education moved from being centripetal and regional to expanding beyond Spanish borders and

FIGURE II. Percentage distribution of Spanish education journals by number of thematic categories



Note. Own contribution using the Scimago Journal Rank (2020).

FIGURE III. Evolution of the number of newly published scientific journals in education in the Spanish context



Note. Own contribution from the Directorio Latindex (2022).

cooperating with other sciences, which is positive. The number of works published in English is also increasing, with the number of authors per article and the number of international collaborations also increasing, from 40.99% in 2011 to 52.68% in 2020. The percentage of papers having only one author decreased from 26.40% in 2011 to 16.31% in 2020, while the percentage of national collaboration remained at 32% (IUNE Observatory, 2022).

This increase, which has been occurring since 1980, can be attributed to several reasons: the diversity of specialities in the field of education and the creation of scientific associations and societies with their own journals; the mass access to university studies, which brought the increase of teaching and research staff with it; the approval of the University Reform Act (1983), which led to the creation of new universities, both public and private, in all the Autonomous Communities, with new Faculties of Education starting their own local journals; the high demand to publish, as a result of the strengthening of the evaluation culture for teaching and research staff; the boom of the internet and, in particular, that of the Open Access movement, which facilitates the publication of these publications - eliminating printing and distribution costs on paper - and, in particular, their dissemination and accessibility. However, according to Díaz Nosty (2017), it is worth questioning whether the current number of journals and the constant appearance of new ones is excessive and unsustainable.

Despite the effort made by editors, not all journals are able to make their way into international databases. This is due, among other reasons, to the high number of scientific journals that exist at the global level. The thematic specialisation of each journal also has an effect, which in many cases is either already covered by other journals, or has a difficult-to-predict impact when the content is only of interest to those academics from certain communities and regions, which makes it extremely difficult to attract citations from researchers outside these communities and regions. Language is another difficulty for internationalisation since many countries still have limitations that prevent them from publishing in English or translating their manuscripts and journals do not have the financial resources to publish bilingual works. In addition to all this is the lack of professionalisation and funding in publishing management, which is one of the biggest challenges for the future, alongside the professional recognition of publishers, who often combine their work with teaching, research, and university management.

This has led to Spanish journals having quickly joined the Open Access movement and offering their content for free online. In addition to the fact that access to knowledge is understood as a right in a learning society, open-access content allows for access and thus the potential for increased citation. In this regard, there are interesting data: of the 67 Spanish scientific journals in education included in SCOPUS in 2020, 60 (89.55%) offer their content in open access. However, of the 769 European journals in education, only 217 (28.22%) do so. This disparity leads us to reflect on the “business model” that exists in the dissemination of science at the international level.

Methodology

In order to analyse the evolution of educational scientific journals in a key decade (2011-2020), a search in the SCOPUS database [November 2022] was carried out, given that it contains a greater number of Spanish scientific journals in education, using the following criteria:

- Firstly, the selection of journals was limited to those that were only indexed in the *Education* category, discarding journals that are also present in other categories.
- Secondly, the time period analysed was limited to the period between 2011-2020. Therefore, only those journals that were indexed in Scopus in 2011 and continued to be indexed in 2020 were considered, to provide a reasonably long period of time and complete data.
- Thirdly, the journals were filtered by “type of document”, with only articles being considered. Other documents such as editorials or reviews were excluded.

Eight source journals that meet the above criteria were identified: *Educación XX1*, *Enseñanza de las Ciencias*, *Estudios Sobre Educación*, *Revista Complutense de Educación*, *Revista de Educación*, *Revista Española de Pedagogía*, *Teoría de la Educación* and *RELIEVE*. These eight journals published a total of 2340 articles for the period under study. The eight journals are analysed below in accordance with a set of indicators: institutional affiliation, evolution of impact and international collabora-

tion, as well as the articles published in them in this period (distribution by year and by journal, language, authors' origin, funding, keywords and citation).

Results: radiography of the scientific contribution of education journals (2011 - 2020)

Analysis of journals by indicator

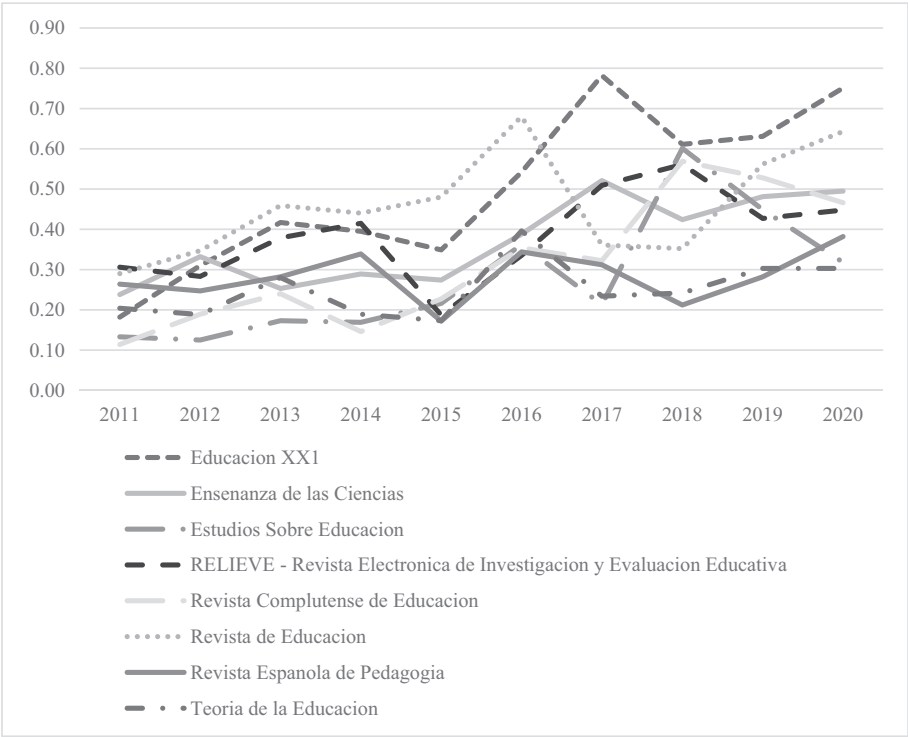
Seven of the eight journals are edited by universities (Autonomous University of Barcelona, Complutense University of Madrid, University of Granada, International University of La Rioja, University of Navarra, National Distance Education University and University of Salamanca), except for the *Revista de Educación*, which is published by the Ministry of Education and Vocational Training. Figure IV shows the SJR indicator values, which measure the scientific influence of journals through the number of citations received and the importance or prestige of the journals from which said citations are provided. A clear positive trend can be seen for the set of data, especially for *Educación XX1* and *Revista de Educación*.

This same trend can be seen in the different quartiles that the journals occupy. Figure V shows that since 2016 there has been an increased presence in Q2, which has led to a shift away from the bottom quartile (Q4).

Moreover, it is noteworthy that four of the eight journals were indexed in 2011 in JCR's SSCI and continue to be indexed today (*Educación XX1*, *Enseñanza de las Ciencias*, *Revista de Educación* and *Revista Española de Pedagogía*), with an impact index that has also shown a positive evolution.

Regarding the levels of international contribution, Table 1 shows a positive trend for most articles coming from other countries (especially from Latin America, specifically Chile, Mexico and Colombia). This progress can be noted from 2016 onwards, with the journals *Enseñanza de las Ciencias* and *Estudios sobre Educación* standing out in this indicator.

FIGURE IV. Evolution of the impact of Spanish journals in the SJR Education category (2011 - 2020)

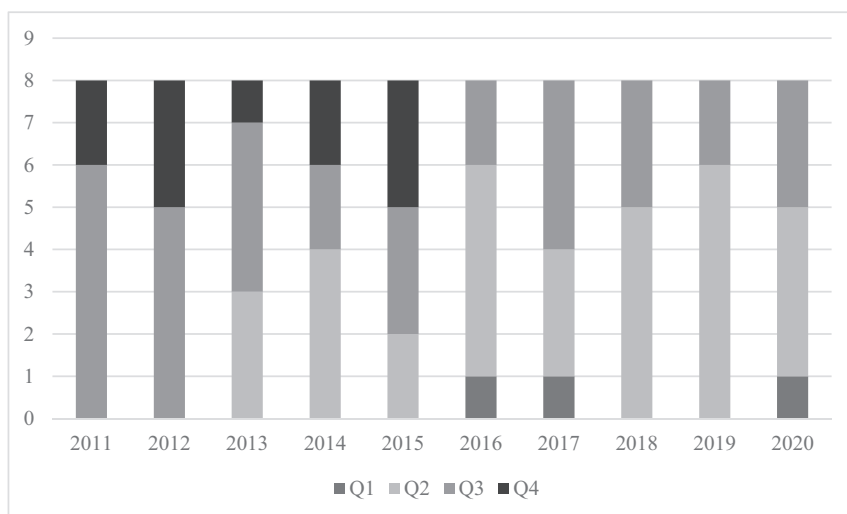


Note. Own contribution using the Scimago Journal Rank (2022).

TABLE I. Evolution of international authorship

Journal / year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Educación XXI	0	11.11	8	17.65	11.43	5.71	10.26	11.32	13.33	12.5
Enseñanza de las Ciencias	15.63	7.69	11.63	12.33	21.57	21.88	15.15	22.58	16.13	19.35
Estudios sobre Educación	4.76	4.76	14.29	5	0	21.05	16.67	16	10.53	19.23
RELIEVE	0	0	21.43	0	16.67	11.76	9.09	18.18	0	11.11
Revista Complutense de Educación	0	8.33	0	8	12.73	5.97	6.58	12.99	3.03	12.77
Revista de Educación	3.85	5.36	3.96	6.52	2.94	9.09	19.44	17.65	17.86	2.78
Revista Española de Pedagogía	0	0	0	0	0	11.54	14.29	11.54	11.54	4.17
Teoría de la Educación	7.14	5.88	10	4.55	0	4.76	3.33	10.71	5.56	13.04

Note. Own contribution using the Scimago Journal Rank (2022).

FIGURE V. Evolution in the quartiles of Spanish education journals in SJR

Note. Own contribution using the Scimago Journal Rank (2022).

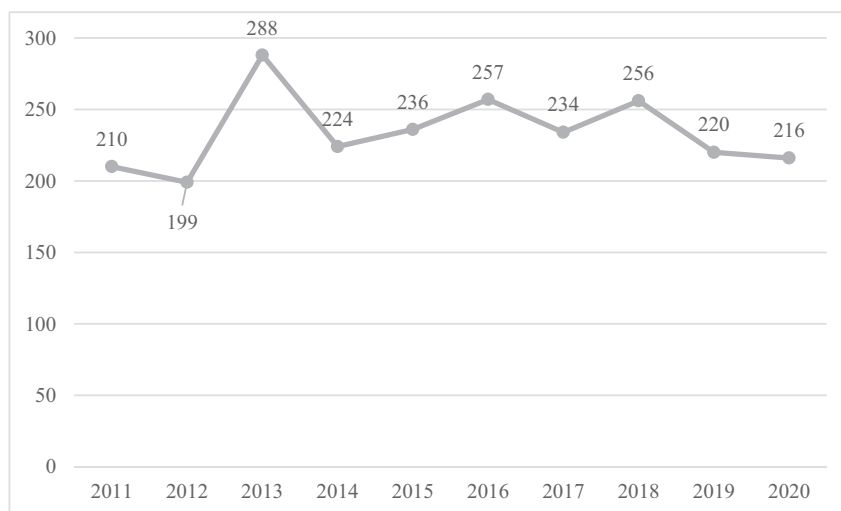
Analysis of articles

Between 2011 and 2020, the eight journals published a total of 2340 articles that, when analysed by year, show the stability of the production, with between 200 and 250 articles being published per year, except for 2013, in which a journal published an extraordinary number of more than 60 articles, which was an increase of more than 40% (Figure VI).

Moreover, the distribution of articles per journal was rather heterogeneous, with the journals with the most works being *Revista Complutense de Educación*, with 465, and *Revista de Educación*, with 460, while *Teoría de la Educación* published 186, and *RELIEVE* published 149, making them, comparatively, the journals with the least articles published.

Regarding language, 1432 articles were published in Spanish, 568 articles in a bilingual Spanish-English edition (a growing trend in recent years), 330 articles were published in English and 10 articles in other European languages.

The institutions to which the authors were attached were mostly based in Spain (n=1982), although also other countries such as Chile (n=94), Mexico (n=89), Colombia (n=58) and the United States (n=55) were also

FIGURE VI. Number of articles published every year between 2011-2020

Note. Own contribution using the Scimago Journal Rank (2022).

found. The origin of the authors was very diverse: those from universities such as Complutense University of Madrid ($n=172$), University of Valencia ($n=138$), University of Seville ($n=133$), National Distance Education University (128), University of Granada ($n=120$) and Autonomous University of Barcelona ($n=105$) stand out.

Another interesting result is that only 179 articles (7.64%), which is a particularly low figure, formally stated the institution funding the research (among which the Ministry of Economy and Competitiveness stands out, followed by the Ministry of Education, Culture and Sport and the Ministry of Science, Innovation and Universities, as well as other institutions such as the European Regional Development Fund, the State Research Agency and the Spanish Federation of Rare Diseases).

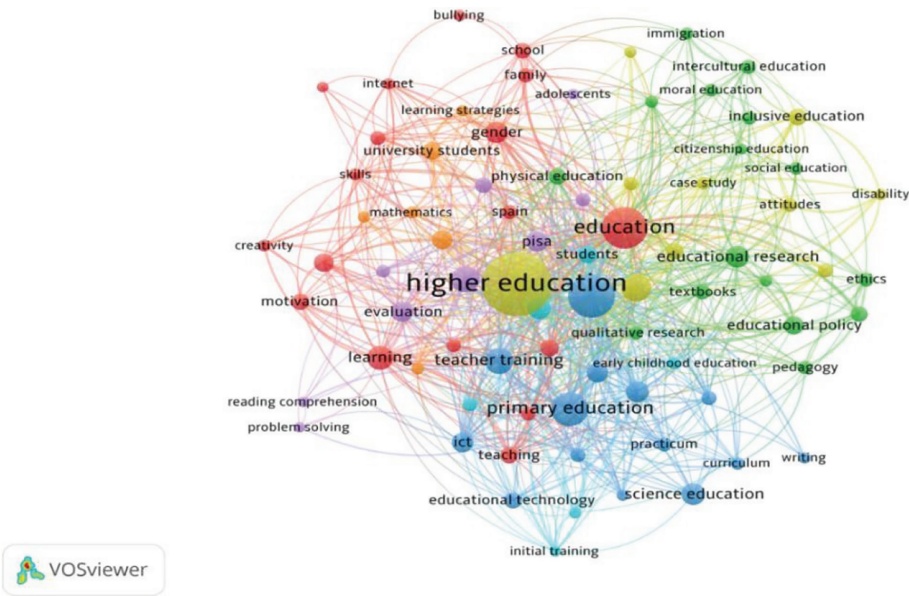
To identify the content, the keywords selected by the authors to tag their articles were analysed. For the 2340 articles, a total of 5790 descriptors were included, of which *higher education* (237), *secondary education* (128), *education* (120), *primary education* (87) and *university* (63), stand out. From this, it can be deduced, firstly, that the educational stage in which the study is carried out appears recurrently as a descriptor, with

higher education standing out in particular; and secondly, that generic descriptors such as *education* are widely used, which does not give the work any identity. Similarly, the lack of accuracy when generating keywords creates other problems such as the difficulty in retrieving the article and being cited. Moreover, 140 keywords that appeared in at least 10 articles were identified, contributing globally to the total with 3171 descriptors (54.76%). These descriptors were categorised through an inductive procedure supervised by two pairs of researchers, resulting in 16 categories, with 1 to 3 subcategories per category. Based on the most recurrent descriptors, themes such as *inclusion, citizenship and coexistence, educational assessment and school results, competences, teacher training and educational technology* were found to be predominant.

This analytic framework offers an important map to explore the reality of scientific production in the journals and years under study, which is shown in Figure VII by showing the analysis of co- occurrences between descriptors using the VOSviewer tool (Van Eck & Waltman, 2010). The prominence of the circles and texts in each cluster represents the strength of co-existence with the other keywords, while the distance between the elements and the lines shows the relationship and link between each keyword. Figure VIII shows the main keywords (larger size and higher frequency) and the ratio or distance of the nodes. With a threshold of 15 occurrences, we identified 79 keywords from the 5790 total occurrences, that is, 79 keywords appear at least 15 times. From these data, a total of 7 clusters were found (matching colour indicates grouping in the same cluster), showing the interrelation of predominant descriptors:

- *Higher education, university, competence, inclusive education* (yellow)
- *Education, learning, academic performance, gender* (red)
- *Secondary education, primary education, teacher training, ICT* (dark blue)
- *Educational research, educational policy, intercultural education, qualitative research* (green)
- *Assessment, PISA, evaluation, questionnaire* (purple)
- *Academic achievement, university students, mathematics* (orange)
- *Teachers, students, initial training, early childhood education* (light blue)

FIGURE VII. Keyword co-occurrence network by topic distribution



Note. Own contribution from the VOSViewer (2022).

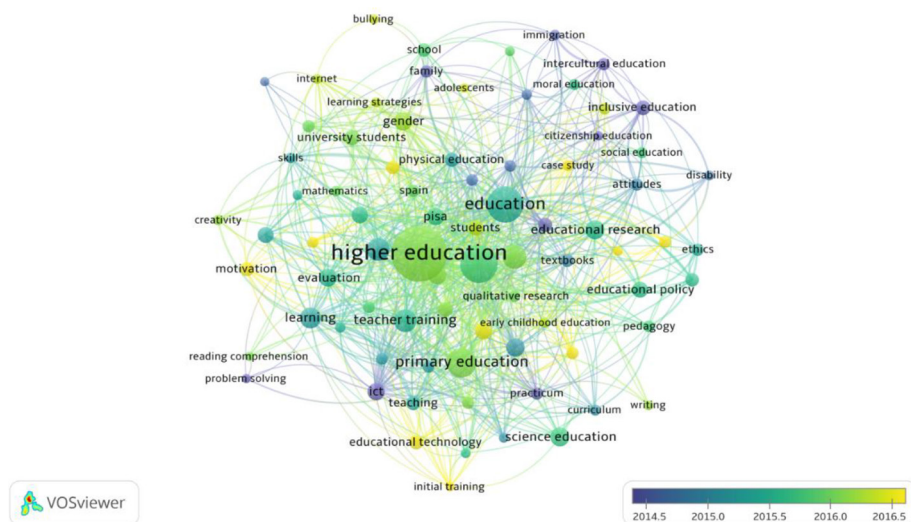
Table II shows the 10 main keywords, including frequencies (occurrences) and link strength.

TABLE II. Main keyword co-occurrences of the publications under analysis

Keyword	Occurrence	Link Strength
Higher education	238	227
Secondary education	128	127
Education	120	111
Primary Education	87	90
University	63	83
Assessment	57	74
Learning	51	69
Teachers	44	68
Students	32	64
Educational innovation	42	54

Using an overlay visualisation, it can be noted that the highest correlations between descriptors were found between 2015 and 2016, with there being varying nuances (Figure VIII).

FIGURE VIII. Keyword co-occurrence network by trending topics over time



Note. Own contribution from the VOSViewer (2020).

Finally, an analysis of the citations referencing the articles was carried out. From the total 2340 articles, 258 (11%) received no citation and 72 (27%) of those not cited were published in 2019 and 2020. Considering that the period under study finished in 2020, it seems reasonable to assume the difficulty with being cited in such a short time, however, 139 of the articles that were not cited (54%) were published between 2011 and 2016. In contrast, we identified 557 articles with at least 10 citations and a total of 154 articles with more than 20 citations. An overall analysis of the most cited articles shows that *Revista de Educación* published 41 of the 100 most cited articles and, if we limit our consideration to the 20 most cited articles, this journal published 13, including research on higher education and, especially, on topics such as educational technology, teacher training and competences.

Discussion

Research in education in recent decades has unquestionably had a positive evolution, which is largely due to the efforts made by the public administrations, the European Commission, universities and the work of university professors, with the collaboration, in many cases, of schools, teachers and professionals from different sectors. It is clear that there has been an exponential increase in the number of scientific journals in education, as well as a new way of managing them. However, the consideration of articles as an almost unique reference for the evolution of research activity and the changes in how researchers disseminate research linked to professional development are also, without doubt, important factors. The aim of this study was to analyse the evolution of Spanish scientific journals in the field of education by using the 8 scientific journals indexed in Scopus between 2011 and 2020 in the category *Education*, as well as their 2340 articles, as a reference.

A positive evolution of these journals in terms of impact and indexation can be seen with the better position in the SJR quartiles in 2020 compared to 2011. The distribution of the articles by year was stable, even though there was variability in the number of papers published.

Moreover, the origin of the authors was mostly focused on Spanish university institutions. These results are in line with the study by Fernández-Cano and Fernández-Guerrero (2022) in their analysis of Spanish educational production in the SSCI in the period 2010-2020. However, in this study, which is framed by Scopus, international collaboration takes place mainly with Latin America, while Fernández-Cano and Fernández-Guerrero (2022) found that international collaboration happens mainly with the United States and England. In any case, the inclusion of the 8 journals analysed in international databases is far from the still limited participation of foreign authors in these publications.

Regarding the publication language, Spanish is the most frequent, although, in recent years, there has been a greater increase in the number of articles in English, which is mainly a result of bilingual Spanish-English editions and the introduction of XML language, which helps international dissemination. This trend can be said to have grown over the last decade when compared to the 4.64% of articles published in a language other than Spanish reported in the bibliometric analysis of Spanish education journals included in the JCR in the period 2001-2010 (Fuentes, Luque &

López-Gómez, 2012). The greater internationalisation that English provides may contrast with what Fejes and Nylander (2017) have called "*anglophone bias*". In other words, an anglophone bias in research may lead to notable situations, such as researchers from non-English-speaking countries publishing in English in journals edited in their countries, whose readers, paradoxically, are mostly non-English-speaking.

Another interesting result is that only 7.64% of the articles analysed formally state the funding source of their research, although the percentage of funded research could be higher if we were sure that all authors complied with the requirement to make this source explicit. However, this percentage is higher than the figure reported by Fuentes, Luque and López-Gómez (2012), which may indicate progress, whether that be in funding or the detailing of it.

The analysis of the keywords shows the concentration on seven major thematic groups, which is a particular contribution of this work. The analysis allows for the conclusion that more relevant and specific descriptors should be included in articles. Keywords such as *education*, *pedagogy*, and *research* are frequently used in the articles under study, despite them hardly providing the articles with any identity. Similarly, it seems important to also avoid using recently created or not very generalised terminology, unusual abbreviations and specific jargon (Uddin & Khan, 2016). The relevance of the descriptors, as well as the careful creation of the title and abstract, are essential for articles to be found by database search engines and for potential readers to reach them, ultimately increasing citation by other authors.

Finally, the percentage of articles that are not cited, excluding those in 2019 and 2020, is similar to those that have more than 20 citations, which shows that the impact of the journal may depend on citations that are concentrated in a handful of articles, which lead to the permanence and growing impact of these journals in the databases, despite the number of articles that do not receive any citations.

This study is not without limitations. Firstly, the study references a set of 8 articles that were selected using the criterion that they continued to be present in the Scopus education category between 2011 and 2020; it, therefore, offers a partial radiography, which restricts the generalisation of its results to the base, indicators and period studied. It is therefore advisable that research continue on this topic to be able to compare the results of other databases and widen the analysis indicators, using a

more extensive time frame. Secondly, the analysis of the research topics came from the keywords of the articles selected by the authors. However, it would be interesting to use other analytical approaches to better infer the content, such as text mining or machine learning.

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