

## ORIGINAL ARTICLE

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### Introduction.

In recent years, there have been various bibliometric assessments in the dental field at international level<sup>1-3</sup>. This is a way of knowing quantitative and qualitative aspects of knowledge production in various scientific disciplines and generates data to design policies which promote scientific development<sup>4</sup>.

Currently, several databases are used as sources to carry out bibliometric assessments but two are most commonly used: Scopus and Web of Science (usually known as ISI); the latter being considered as the de facto standard<sup>3</sup>. The most commonly measures used in these evaluations are productivity (number of published articles) and the impact factor (number

## Bibliometric analysis of dental education journals, Web of Science, 2007-2013.

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**Abstract:** In recent years, several bibliometric evaluations covering various clinical specialties in dentistry have been carried out. However, there are no recent reports in the area of education. The aim of this brief report is to describe the bibliometric profile of dental education journals included in the Web of Science databases (ISI). A bibliometric study of the two dental education journals included in the Science Citation Index expanded database from Web of Science was conducted. *Analyze results* and *Citation Report* tools were used to consider the following variables for the total of articles by journal: amount of papers, publication year, affiliated organizations and countries, keywords, number of citations and most cited articles. A total of 1,279 articles were analyzed: *Journal of Dental Education* (JDE) with 956 papers (74.75%) and *European Journal of Dental Education* (EJDE) with 323 papers (25.25%). The United States had the largest number of articles (695), mainly in JDE, and England (110) in EJDE. Consistently, American institutions have the highest productivity in the area. The more used keywords were learning and curriculum. Given the influence that dental education has in all the areas of the profession, it is necessary to further investigate and focus on the quality of research in this area. **Keywords:** "Education, dental" [Mesh], "Bibliometrics" [Mesh], Web of Science.

## Análisis bibliométrico de revistas de educación dental, Web of Science, 2007-2013.

**Resumen:** En los últimos años se han realizado diversas evaluaciones bibliométricas en odontología, cubriendo varias especialidades clínicas. Sin embargo, no existen reportes recientes en el área educativa. El objetivo de este breve informe es describir el perfil bibliométrico de las revistas de educación dental incluidas en las bases de datos de Web of Science (ISI). Se realizó un estudio bibliométrico de las 2 revistas de educación dental incluidas en la base de datos Science Citation Index Expanded de Web of Science. Utilizando las herramientas *Analyze Results* y *Citation Report* se obtuvieron las siguientes variables: Cantidad de documentos, Año de publicación, Organizaciones y Países en la afiliación, Palabras clave, Número de citas y Artículos más citados; para el total de los documentos y separados por revista. Se analizaron 1.279 documentos: *Journal of Dental Education* (JDE) con 956 documentos (74,75%) y *European Journal of Dental Education* (EJDE) con 323 documentos (25,25%). Estados Unidos tiene la mayor cantidad de artículos (695), principalmente en JDE, e Inglaterra (110) en EJDE; de igual forma son las instituciones estadounidenses las que tienen una mayor productividad en el área. Las palabras clave más utilizadas fueron aprendizaje y currículum. Dada la influencia que tiene la educación dental en todos los ámbitos de la profesión, es necesario seguir investigando y centrarse en la calidad de la investigación en esta área. **Palabras clave:** Educación dental, Bibliometría, Web of Science.

of citations an article attracts over a period of two years). Additionally, some indexes are trying to mix two variables into a single one, as the Hirsch or h-index which equals the amount of n articles with at least n citations<sup>4</sup>.

In dentistry, evaluations about specific clinical areas, such as oral and maxillofacial surgery<sup>5</sup>, implantology<sup>6</sup>, orthodontics<sup>7</sup>, periodontal regeneration<sup>8</sup>, endodontics<sup>9</sup>, among others, have also been recently conducted. In general, these studies have shown that research is of a low level of evidence and concentrated in a few developed countries<sup>5-9</sup>, although some developing countries have placed in better positions in the past few years<sup>1-3</sup>.

The area of dental education impacts all dental

specialties, as they depend on the educational methodologies being used in the profession. However, no bibliometric assessments have been carried out in dental education recently<sup>10</sup> or they have only focused on specific publications from the United States<sup>11-12</sup>.

The objective of this brief report is to describe the bibliometric profile of dental education journals included in the Web of Science databases (ISI).

### Materials and methods.

A bibliometric study focused on publications about dental education was conducted. The analyzed database corresponded to the Science Citation Index Expanded Web of Science in the Web of Knowledge platform (Thomson-Reuters, New York, USA). All journals in the "Dentistry, Oral Surgery & Medicine" category were reviewed. The analysis included only those focused on the area of Dental Education regardless of publication year. The algorithm used in the advanced search system corresponded to:

OS= (EUROPEAN JOURNAL OF DENTAL EDUCATION OR JOURNAL OF DENTAL EDUCATION)

These results included documents in the Articles and Reviews categories, excluding proceedings, letters and editorial material.

By using *Analyze Results* from the Web of Knowledge platform, information on the following variables was obtained from all the articles and separated by journal: the amount of documents, publication year and affiliated organizations and countries.

With the *Citation Report* tool from the Web of Knowledge platform, information on the following variables was obtained: number of citations and most cited articles.

Based on keywords from the 500 most cited articles,

Country	Journal		
	Journal of Dental Education	European Journal of Dental Education	Total
United States	653 (68.3 %)	42 (13.0 %)	695 (54.3 %)
England	21 (2.2 %)	89 (27.6 %)	110 (8.6 %)
Canada	86 (9.0 %)	9 (2.8 %)	97 (7.6 %)
Australia	25 (2.6 %)	38 (11.8 %)	63 (4.9 %)
Holland	5 (0.5 %)	44 (13.6 %)	49 (3.8 %)
India	34 (3.6 %)	7 (2.2 %)	41 (3.2 %)
Germany	14 (1.5 %)	25 (7.7 %)	39 (3.0 %)
Wales	5 (0.5 %)	33 (10.2 %)	38 (3.0 %)
Brazil	30 (3.1 %)	3 (0.9 %)	36 (2.8 %)
Ireland	7 (0.7 %)	26 (8.0 %)	33 (2.6 %)

Table 1. Distribution of articles in dental education journals according to country of origin, 2007-2013.

a keyword cloud, including the 50 most commonly used ones, was generated by a web service, Wordle.net.

The information was tabulated in a MS Excel 2003 worksheet (MS Corp., Redmond, USA). The data were presented using graphs and tables with frequency and percentages.

### Results.

A total of 1,279 publications from two dental education journals: *Journal of Dental Education* (JDE) with 956 documents (74.75%) and *European Journal of Dental Education* (EJDE) with 323 documents (25.25%) were analyzed. Both journals were indexed in Web of Science in 2007. Distribution of articles according to year of publication is shown in Figure 1.

Table 1 shows distribution of the ten countries with the largest number of publications, at least thirty each, sorted by the total in both journals.

Table 2 shows distribution of the twenty institutions with the largest number of publications, at least twenty five each, sorted by the total in both journals.

Table 3 shows the twenty most cited articles in April 2014. Figure 2 shows the word cloud. "Dental" and "education" were the most widely cited keywords.

In order to assess other terms, both words were excluded from the graphic analysis

Institution	Journal of Dental Education	European Journal of Dental Education	Total
U. of California System	66	2	68
Harvard U.	40	3	43
U. of California Los Angeles	42	1	43
U. of Michigan	42	1	43
U. of Michigan System	42	1	43
Cardiff U.	5	33	38
U. of The Pacific	31	4	35
HSC U. of Texas - San Antonio	33	1	34
U. of Illinois Chicago	31	2	33
U. of Illinois Chicago Hospital	31	2	33
U. of Illinois System	31	2	33
New York U.	30	2	32
U. of Iowa	26	4	30
U. of Connecticut	28	1	29
Florida State U. System	25	3	28
U. of Missouri System	27	1	28
U. of Florida	24	3	27
MINUTES - U. of Amsterdam	4	22	26
U. of Missouri Kansas City	25	1	26
U. of North Carolina Chapel Hill	21	4	25

Table 2. Distribution of articles in dental education journals according to institution of origin, 2007-2013.

Article	Journal	Date	Citations
The academic environment: the students' perspective	Eur J Dent Educ	Feb 2008	39
Profile and competences for the graduating Europeandentist - update 2009	Eur J Dent Educ	Nov 2010	37
Potential of information technology in dental education	Eur J Dent Educ	Feb 2008	34
Dental school vacant budgeted faculty positions, academic years 2005-06 and 2006-07	J Dent Educ	Mar 2008	32
Assessing Dental Students' Competence: Best Practice Recommendations in the Performance Assessment Literature and Investigation of Current Practices in Predoctoral Dental Education	J Dent Educ	Dic 2008	31
The revitalization of US dental education	J Dent Educ	Feb 2008	30
Trends in the placement of posterior composites in dental schools	J Dent Educ	Mar 2007	29
Curriculum Change in Dental Education, 2003-09	J Dent Educ	May 2010	28
Annual ADEA survey of dental school seniors, 2006 graduating class	J Dent Educ	Sep 2007	25
Methods for Evaluating Change in Community-Based Dental Education	J Dent Educ	Feb 2009	24
Salivary diagnostics: enhancing disease detection and making medicine better	Eur J Dent Educ	Feb 2008	24
Assessment of faculty perception of content validity of PerioSim (c), a haptic-3D virtual reality dental training simulator	J Dent Educ	Dec 2007	24
Curriculum content, structure and ECTS for European dental schools. Part II: methods of learning and teaching, assessment procedures and performance criteria	Eur J Dent Educ	Ago 2007	24
Renewing professionalism in dental education: Overcoming the market environment	J Dent Educ	Feb 2007	23
The Evaluation Framework for the Dental Pipeline Program with Literature Review	J Dent Educ	Feb 2009	22
Emerging allied dental workforce models: Considerations for academic dental institutions	J Dent Educ	Nov 2007	22
Emotional intelligence and perceived stress in dental undergraduates: A multinational survey	J Dent Educ	Feb 2007	22
Is there an association between weight and dental caries among pediatric patients in an urban dental school? A correlation study	J Dent Educ	Nov 2007	21
Psychological stress and health in undergraduate dental students: fifth year outcomes compared with first year baseline results from five European dental schools	Eur J Dent Educ	May 2008	20
Financing clinical dental education	J Dent Educ	Mar 2007	19

Table 3. List of the 20 most cited articles published in dental education journals, 2007-2013.

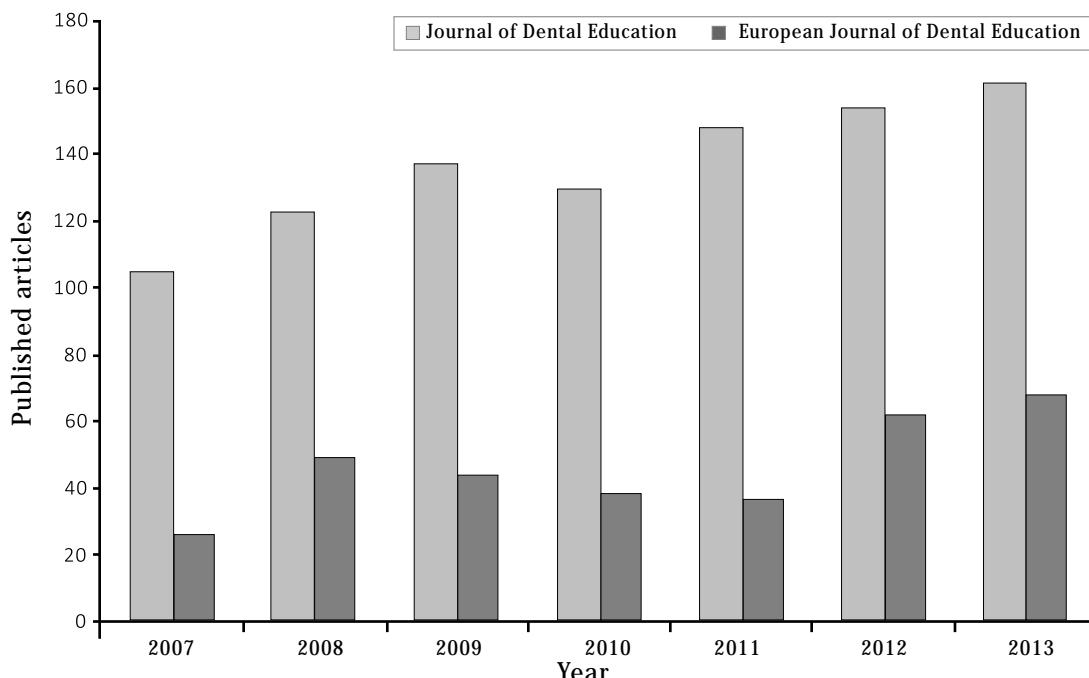


Figure 1. Distribution of articles in dental education journals, 2007-2013.



Figure 2. Keyword cloud of the 500 most cited articles published in dental education journals, 2007-2013.

### Discussion.

The results of this study indicate that JDE triples the productivity of EJDE. The articles published in these journals are mostly from United States, in the case of JDE, and England, in the case of EJDE, with preponderance of American institutions. The subject with the highest impact in dental education relates to curriculum and learning.

It is difficult to explain why JDE triples the amount of published articles in EJDE. It might be due to specific factors regarding the editorial process of both journals, the age of JDE and older associated research networks. However, from 2007 to 2013, the number of published articles in EJDE has increased and tripled the one in JDE. Therefore, the gap between the two magazines would likely disappear in the medium term. In any case, these differences do not seem to have influenced the impact factor (IF) of both journals. According to the Journal Citation Report 2012<sup>13</sup>, EJDE has an IF of 1.012 and JDE presents 0.989. Neither does it seem to influence the most cited articles. In spite of the fact that the first three items on the list were published in EJDE, fourteen of the twenty most cited belong to JDE, which is close to the overall proportion of articles published by both journals.

By analyzing the origin of the articles, it can clearly be seen that there is an inbred tendency. In the case of JDE, nearly 70% of its articles have authors affiliated with an American institution and in the case of EJDE almost 40% are affiliated to an English one, matching previously reported data<sup>10</sup>. This scenario is not inherently undesirable, understanding that many scientific journals have rather geographically bounded audiences associated with national or continental agencies. Besides, the educational models in dentistry are different in Europe<sup>14</sup> and North America<sup>15</sup>, thus this tendency is expectable.

The increased presence of American institutions is mainly associated with the highest proportion of articles in JDE over EJDE. Besides, it relates to higher productivity in dental sciences by the United States, which widely leads the rankings at the level of publications in ISI journals<sup>3</sup> and Scopus<sup>1-2</sup>.

In relation to the keywords, *education* and *dental* were the most widely used with similar proportions, then, they were not considered to better appreciate the rest of them. Beyond generic words for the area, such as *students*, *health* and *dentistry*, it can be observed that the most commonly used terms correspond to *learning* and *curriculum*. This is partially coincident with a prior study on content analysis of articles published between 2003 and 2008 in both journals<sup>10</sup>. In this report, the major topic was curriculum, but no studies on learning theories were counted. This difference may be due to the fact that, between 2007 and 2013, articles relating assessment of students' learning rather than theories on the area were published. Nevertheless, the evaluation of this fact exceeds the goal of this report and should be addressed in future studies.

Regarding curriculum, there is a strong interest in identifying the key aspects of the way in which future dentists are being educated and how to efficiently improve it<sup>14-15</sup>. Also, considering the differences between and within countries, it is likely that curriculum remains the main research topic in dental education.

Given the influence that dental education has in all areas of the profession, it is necessary to further investigate and focus on the quality of research in this area.

The results of this research support the conclusion that scientific productivity published in the two most important journals in dental education, as well as a greater development in curriculum and learning, is concentrated in few countries, led by The United States and its institutions.

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