An approach to interdisciplinarity and specialization measurement

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Introduction

When Eugene Garfield (1972) developed his citation indexes he probably did not think his method would outline the path for the study of how knowledge is organized, but citation indexes became a global reference for journal evaluation and nowadays researchers are evaluated according to them. Problem is citation indexes generated by institutions like Thomson Reuters, are organized on a particular knowledge classification and some journals are (or could be) within more than one discipline (see Thomson Reuters multi-assignation of journals in subject categories), and these knowledge classifications do not necessary match the ones used by countries evaluation organisms (López & Giménez) or by other reference indexes (e.g. the European Reference Index for the Humanities). As a result, many researchers and journals are in risk of being underestimated when evaluated. That is one of the reasons why it is so important the study of Interdisciplinarity (non-disciplinary knowledge, in a broad sense) and specialization (disciplinary knowledge). Other approaches have been made, for example examining interdisciplinarity on the base of assignation of journals to more than one subject category (Morillo, Bordons, & Gómez, 2003), around betweenness centrality as an indicator of interdisciplinarity (Leydesdorff, 2007), measuring researchers interdisciplinarity and specialization (Porter et al. 2007), analyzing behavior of Spanish universities focusing on four disciplines (Bordons, et al. 2010) and designing a study for the measure of the different forms of interdisciplinarity research (Huutoniemi, et al., 2010).

In this poster two new indicators are proposed, being the main data source IN-RECS, "a bibliometric index that offers statistical information from a count of the bibliographical citations, seeking to determine scientific relevance, influence, and impact of Spanish social-science journals." (EC[3])

Objectives:

- To characterize In-RECS fields and journals on a degree of specialization or interdisciplinarity according to the analysis of citation among disciplines.
- To design and to apply indicators in order to measure the degree of interdisciplinarity or specialization of disciplines and journals depending on citations they receive from other disciplines and journals.
- To settle down the basis for the development of new studies about the relation between these two indicators and other indicators or data such as the Impact Factor or national and international citations.

Methodology

Initial information and sources

The data grounding this research is a set of 599 Spanish journals included in IN-RECS, classified in 10 fields belonging to the Social Sciences, and the Arts & Humanities, and the following variables for each of the journals: number of citations received from other field's publications (external citations hereinafter) in a (1996-2009) period, number of citations received from the field the journal is attached to (internal citations hereinafter) in the same period, and number of fields from which the external

citations are provided to the papers in each journal in the selected period.

Table 1. Formulation of indicators JSII and FSII.

Journal Specialization – Interdisciplinarity Indicator	Field Specialization – Interdisciplinarity Indicator
JSII = % I_c / (N_{ca} + 1)	FSII = % I_c /(MeanN_{ca}+1)
Where: % I_c is the percentage of internal citations. % N_{ca} is the number of fields from which the external citations come from. MeanN_{ca} is the mean of the number of fields from which the external citations come from.	

Procedure

Once the calculus of the percentages and means for the field indicator was executed, the next step was the calculus of the individual journal indicator. With this information, the quartile's values of the individual journal indicator where calculated, and the values of the field's indicator plotted.

Results

1. Different degrees of specialization-interdisciplinarity are identified among fields: Psychology with a maximum value in FSII (≈18) is considered the most specialized field in the set, Political and Administration Sciences, with a minimum value in FSII (≈3) is considered the most interdisciplinary field in the set.

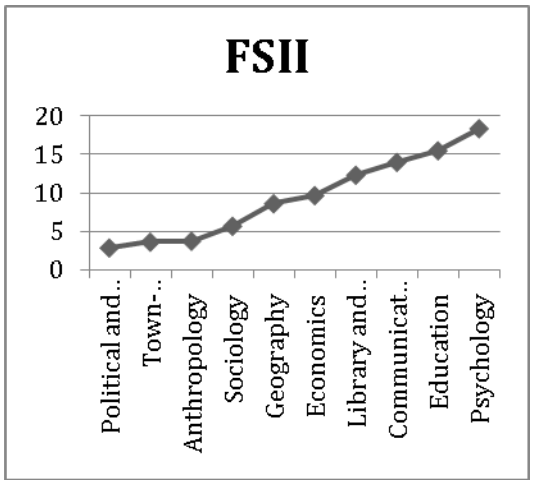

Figure 13.Field specialization - interdisciplinarity indicator applied to In-RECS areas.

2. Four degrees of specialization-interdisciplinarity are identified among the journals of a field: Anthropology in this case. The journals, which title has been recoded into a number, have been organized in quartiles according to their level of specialization-interdisciplinarity.

Table 2. Distribution of Anthropology Journals Quartiles by FSII: case study.

1st. Q.			2nd. Q.	
JC	FSII		JC	FSII
18	100		23	7,87
24	43,75		11	5,6
15	25		7	4,71
4	16,67		1	4,41
10	10,19		27	4,29
28	10		21	4
13	8,57		5	3,53
3rd. Q.			4th. Q.	
JC	FSII		JC	FSII
3	3,33		2	1,9
6	2,95		12	0
20	2,77		14	0
29	2,5		16	0
9	2,22		17	0
8	2,02		22	0
19	1,98		25	0
			26	0

(Note: a Journal Code, JC, has been attached to each journal's title)

Discussion and conclusions

- Indicators proposed can help to categorize journals, so they can be fairer evaluated and placed between other journals in a thematic ranking.
- If the most interdisciplinary or specialized journals are identified, it will be possible deal with them separately instead of compare their values in a ranking with other more disciplinary or generalist journals.
- If information regarding other bibliometric indicators is taken into account, it would be possible to characterize fields and journal's specialization-interdisciplinarity

profiles by crossing its quartile's position with this information.

- These two indicators are a new approach to the study of interdisciplinarity-specialization which do not substitute previous studies, but complement them.

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