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SCIENTIFIC DOMAIN ANALYSIS OF PROFESSIONAL COMPETENCES

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10 de octubre de 2013

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Scientific domain analysis of professional competences

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Abstract

The emerging paradigm of skills has been studied by different disciplines, and it has generated a broad spectrum of research literature regarding competences, both work and executive competencies, but there is not necessarily agreement among authors on the definition of the term.

Through this paper we attempt to give an approximation of the intellectual structure of research related to professional competences. Our aim, through reflection on the approaches and trends of the use of this term, is to contribute to improving the work of professionals in raising awareness of the implicit and explicit aspects of the term and how subjective it can be.

Using scientific domain analysis, a new paradigm of information science, we studied the set of publications in journals listed in the multidisciplinary databases: "Web of Science" and "Scopus" from 1950 to mid-2012.

The maps generated using the scientific visualization software "Citespace II" allowed us to visualize the lines of research, specialties and trends of the professional competences wherein we identified eight groups formed from characteristics and common research topics.

Keywords: Professional competences, Social network, Map of science;

1. Introduction

There is a very broad spectrum of research literature generated regarding professional competences where this term has developed in various scenarios. The number of definitions is probably countless where "professional competences" are determined as multidisciplinary, transversal, multidimensional and transnational (Tobón, 2006; Guerrero, De los Ríos & Díaz-Puente, 2008).

Sergio Tobón (2006) describes eight perspectives: Greek philosophy, Modern philosophy and sociology, Linguistics, The scenario changes in the workplace, Cognitive psychology, Psychology of work, The education scenario for the job, and Formal education. We are in agreement with the definition of the International Project Management Association: "competence is a compendium of knowledge, personal attitudes, skills, and relevant experience necessary to succeed in a given role".

Through this paper we attempt to give an approximation of the intellectual structure of research related to professional competences. Our aim, through reflection on the approaches and trends of the use of this term, is to contribute to improving the work of professionals in raising awareness of the implicit and explicit aspects of the term and how subjective it can be.

First we describe the research methodology used to perform analyses and the visualization of the scientific domain of professional competences. Finally we present our conclusions.

2. Research methodology

The process followed was divided into 6 steps: traditional bibliographical analysis, selection of source, search configuration, treatment of data, selection of software, and interpretation and analysis of domain visualization. It was necessary to perform a traditional literature review to help define the characteristics of the data sources and we chose to work with two worldwide multidisciplinary bibliographic databases: Scopus (2010) and ISI Web of

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Science (2006). It was also necessary to define an advanced search that allowed us to extract the data for further processing by avoiding redundancy of information. Finally, we defined criteria for selecting visualization software, which led us to the decision to work with Vosviewer (Van Eck & Waltman, 2010) and Citespace II (Chen, 2006).

3. Visualization of Domain

The results presented correspond to four types of analysis: documents co-citation, categories co-citation, co-occurrences of terms, and hybrid analysis of keywords and documents.

3.1. Documents Co-citation Analysis

In this analysis are listed the relevant documents recorded in two worldwide multidisciplinary bibliographic databases: Scopus (2010) and ISI Web of Science (2006). These documents have a high degree of centrality (see Table 1 and 2). This measure refers to the number of direct links that a node has with its environment so a document with a high degree of centrality have greater visibility and importance within the research network of professional competences.

Among documents listed we mention the work of McClelland (1973) and Boyatzis (1982) focused on behavioral elements rather than the human intellect for the development of the person, the work of Bloom (1984) focused on the cognitive activity of the person; the work of Prahalad (1990) focused to create a competitive organization and learning through individual skills gear; research Schon (1987) and Bandura (1986) (1997) focused on integrating all aspects of people.

Spencer's work (1993) analyzed 650 papers based on 20 years of research using the methodology of assessment of competences at work belonging to McClelland.

Shippmann's work (2000) and Mansfield (1996) compares and contrasts the approach of work. Lave (1991) and Shulman (1987) explore the competences in higher education, examines the dominant ideology of the curriculum (competence and capacity), fostering the skills learning as social process, requiring the pedagogical training of teachers. And Baumert (2006) seeks international debate on professional standards in the teaching profession in order to achieve a high quality of training and personal development of students.

Table 1. Documents with a high degree of centrality – Scopus

Degree of centrality	Year	Document
0.23	1987	Schon da, 1987, ed reflective practi, v, p
0.22	1973	Mcclelland.dc, 1973, am psychol, v28, p1
0.18	1993	Spencer lm, 1993, competence work mode, v, p
0.12	1982	Boyatzis re, 1982, competent manager mo, v, p
0.11	1990	Prahalad ck, 1990, harvard bus rev, v68, p79
0.09	2000	Shippmann js, 2000, pers psychol, v53, p703

Fuente: Elaboración propia

Table 2. Documents with a high degree of centrality – Scopus

Degree of centrality	Year	Document
0.44	1997	Bandura a, 1997, self-efficacy: the exercise of control, v, p
0.35	1982	Bandura a, 1982, american psychologist, v37, p122
0.14	1987	Shulman l, 1987, harvard educational review, v57, p1
0.13	1991	Lave j, 1991, situated learning: legitimate peripheral participation, v, p
0.11	2006	Baumert j, 2006, zeitschrift fur erziehungswissenschaft, v9, p469
0.06	1996	Mansfield rs, 1996, hum resource manage, v35, p7

Fuente: Elaboración propia

3.2. Categories Co-citation Analysis

The maps have been generated with the software Citespace II on data extracted from ISI Web of Science and Scopus (see Figures 3).

To perform the analysis of the graphs found we must consider the following: nodes with high centrality are highlighted in the chart with a purple outer ring, the citation history of a node is represented by the node rings around it, and the relationships presented express the connection between nodes to be cited together by a third node. This can be checked by looking at the colour scale at the bottom.

In this analysis the nodes represent the categories of documents and demonstrate the multidisciplinary nature of competences (see Figure 3). We can see eight groups of categories related to the perspectives of Sergio Tobón: medicine, sociology, education, linguistics, psychology, management, engineering, and computer science.

The education group has a high degree of centrality because of the pedagogical character of professional competences. The relationships' colour is more varied. We observed historic relationships between education and law due to the need to develop the competences of professionals in this discipline, and we see recent connections between education, engineering and computer science due to a trend that reflects the importance of engineering and technology as central to the development of competence models.

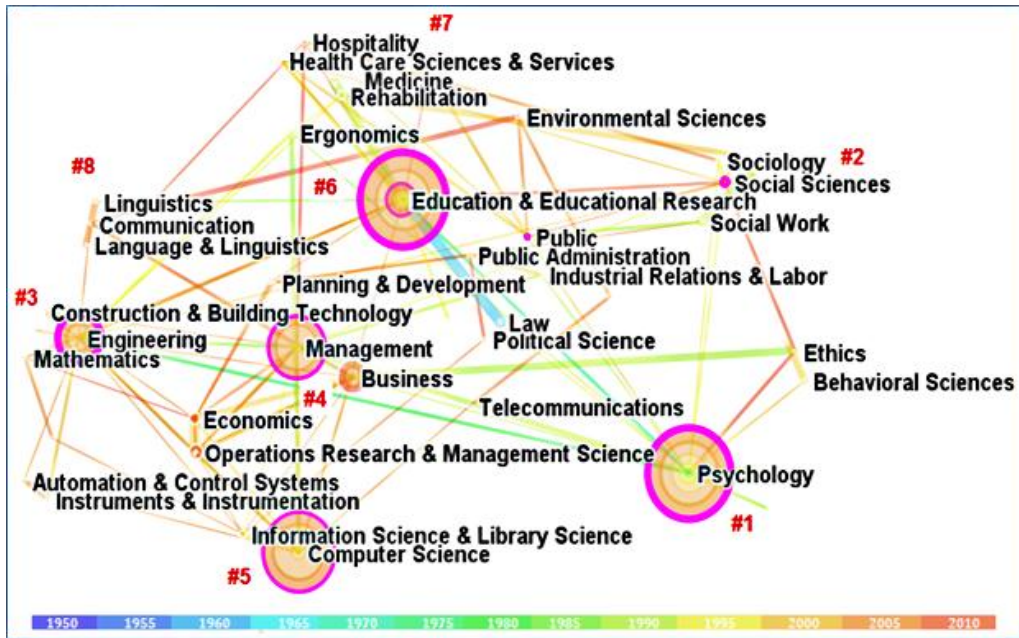


Figure 3. Categories co-citation using ISI Web of Science

3.3. Term Co-occurrence Analysis

Here we analyze the terms of the documents, whether keywords, titles or abstracts of papers, which are grouped according to the relationship between the documents (see Figure 4).

This map was generated using the VosViewer software and shows a cloud of terms wherein we can identify six groups: the perspective of education for work and labour psychology, the perspective of cognitive psychology, the contributions of formal education, competences from the perspective of the world of work, and there are some additional terms related to technology and engineering in Figure 4(a).

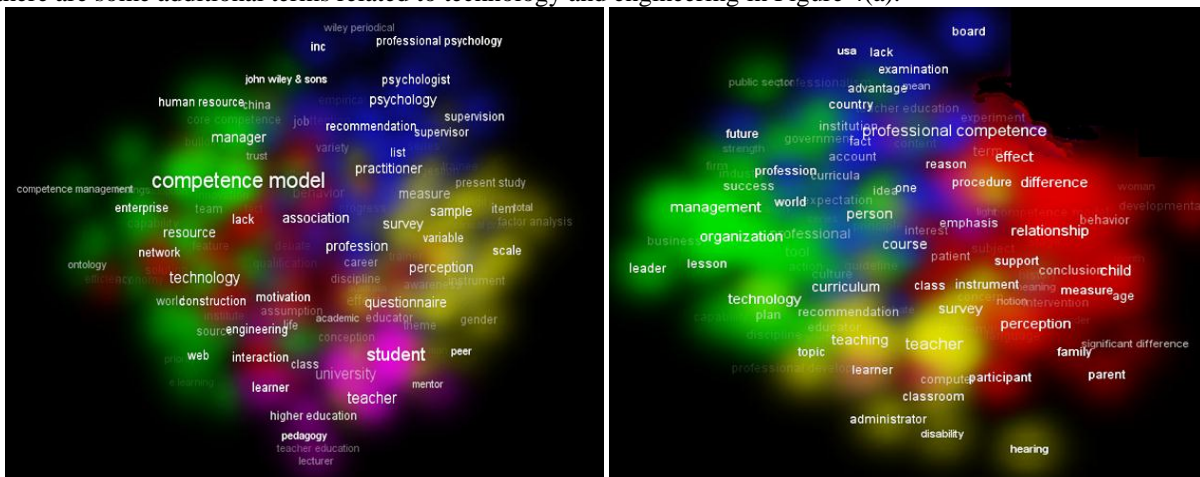


Figure 4 (a) Categories co-citation using ISI Web of Science; (b) Categories co-citation using Scopus

3.4. Hybrid analysis of keywords and documents

We related documents and keywords in these types of maps where we found 8 groups in both databases (see Figures 5 and 6).

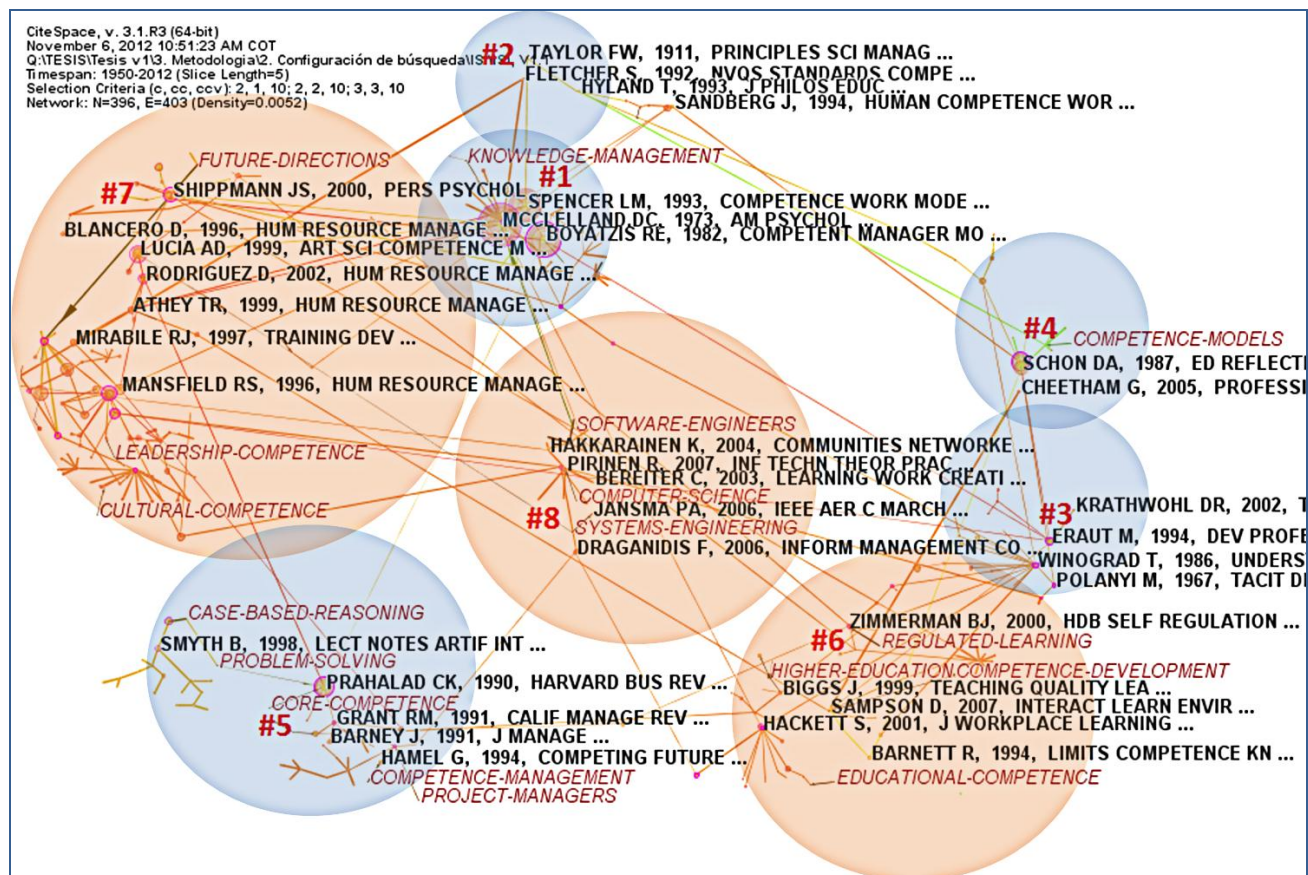


Figure 5. Hybrid analysis of keywords and documents using ISI Web of Science

In **Group #1** we find McClelland (1973), Boyatzis (1982) and Spencer (1993) who emphasize the individual's behaviour as a major factor in job performance; analyzing competences using behavioural theory. In **Group #2** we find Taylor (1980), Fletcher (1991), Hyland (1993) and Sandberg (2000), who debate on establishing competences from the essential functions of the individual; analyzing competences using the workplace approach.

In **Group #3** we identify Bloom, Krathwohl (2002), Eraut (1994) and Winograt (1987) who describe the cognitive processes and knowledge of learning of the individual; analyzing competences from a cognitive motivational approach. In **Group #4** we identify Schon (1987) and Cheetham (2005) who consider competition to be the result of a mixture of underlying personal issues; analyzing competences using a holistic approach. In **Group #5** we identify Prahalad (1990) and Hamel (1994) focusing on the core competencies of organizations to build competitive advantage; analyzing competences from a strategic business approach. In **Group #6** we identify Biggs (1999), Barnett (1994), Hackett (2001) and Zimmerman (2000), who describe training approaches

in higher education and the importance of training teachers in the learning process; analyzing competences in Higher Education.

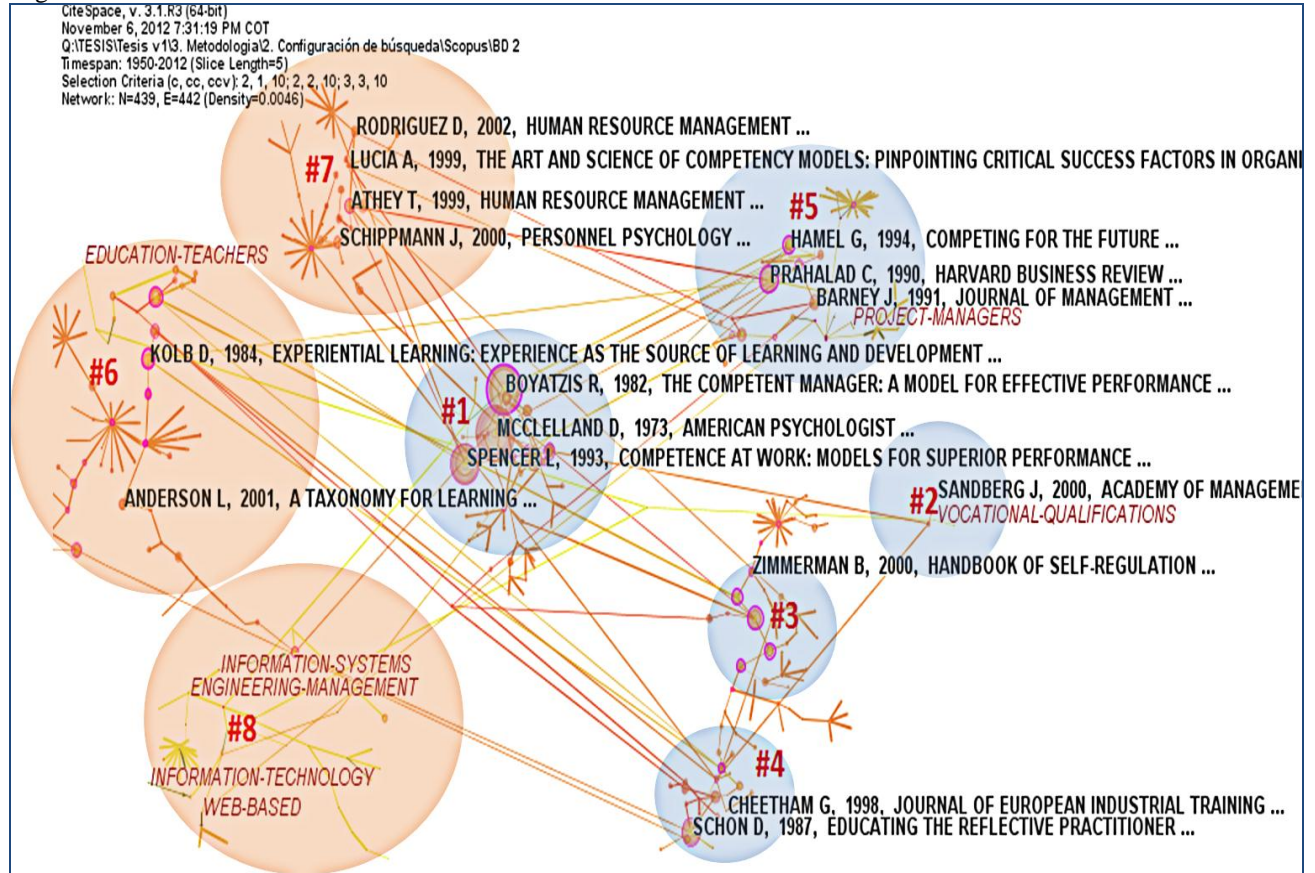


Figure 6. Hybrid analysis of keywords and documents using Scopus

The **Group #7** is identified as Shippmann (2000), Athey (1999), Blancero (1996), Lucia (1999), Mansfield (1996), Mirabile (1997) and Rodriguez (2002), who described competence models to promote career development and a new perspective on human resources management; analyzing competences from the perspective of occupational psychology. In **Group #8** we find Hakkarainen (2004) and Draganidis (2006), who conclude that technology plays an important role in the development of competence management systems; analyzing competences from the perspective of Engineering and Technology.

4. Conclusions

The visualization of the scientific domain of professional competences should be considered as a complement to, and not a replacement of, traditional methods.

The analysis seeks to guide future research to visualize the main lines of research, specialties and trends in professional competences.

Through the analysis we have identified eight groups: Competences from behavioural theory, Competences in the workplace, Cognitive and motivational competences, Holistic approach of competences, Core competences as a business strategy, Competences in higher education, Competences in industrial psychology, and Competences in the context of engineering and technology

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