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CONTRIBUTING RESEARCHES :

INVESTIGACIÓN BIBLIOTECOLÓGICA, 29 (67), September/December, 2015, México, ISSN: 0187-358X

Antonio Pulgarín-Guerrero
Facultad de Ciencias de la Documentación y Comunicación. Universidad de Extremadura. Badajoz, España.
E-mail: pulgarin@alcazaba.unex.es

Beatriz González Suárez
Centro de Información Cartográfico y Territorial de Extremadura, Consejería de Fomento, Vivienda, Ordenación del Territorio y Turismo Avenida de las Comunidades, s/n. 06800 Mérida, España
E-mail: beatriz.gonzalezsuarez@gisvesa.com

Catalina Naumis Peña
Instituto de Investigaciones Bibliotecológicas y de la Información, UNAM. Torre II de Humanidades, Piso 12, Circuito Interior, Cd. Universitaria, Colonia Copilco Universidad, Delegación Coyoacán, 04510, México, D.F.
Tel.: (5255) 5623 0346
E-mail: naumis@unam.mx

Gabriela Mansilla and *Marcela Verde*
Universidad Católica de Córdoba (Depto. Procesos Documentales); (Depto. Gestión de Calidad). Avenida Armada Argentina 3555. X5016DHK Córdoba - Argentina.
Tel: (54) 351 4938000 Inte 454
E-mail: gmansilla05@yahoo.com.ar
E-mail: marcelabverde@gmail.com

Gilberto Anguiano Peña
El Colegio de México, Diccionario del Español de México. Camino al Ajusco 20, Col. Pedregal de Santa Teresa, México D. F., C. P. 10740
(5255) 54493044
E-mail: ganguia@colmex.mx

Gloria Patricia Marciales Vivas
Pontificia Universidad Javeriana (PUJ). Carrera 5 No 39-00 Bogotá, Colombia.
Tel.: +57.1.3208320 Ext. 5741,
Fax: +57.1.3208320 Ext. 5717
E-mail: gloria.marciales@javeriana.edu.co

Harold Castañeda Peña
Universidad Distrital Francisco José de Caldas. Carrera 7 No 57B- 53 Bogotá, Colombia.
Fax +57.1.3239300
E-mail: hacastanedap@distrital.uis.edu.co

Héctor Alejandro Ramos Chávez
Instituto de Investigaciones Bibliotecológicas y de la Información, UNAM. Torre II de Humanidades, Piso 12, Circuito Interior, Cd. Universitaria, Colonia Copilco Universidad, Delegación Coyoacán, 04510, México, D.F. Tel.:
(52 55) 5623 0379
E-mail: aramos@iibi.unam.mx

Isidoro Gil Leiva
Facultad de Comunicación y Documentación. Universidad de Murcia. Murcia, España
E-mail: isgil@um.es

Jorge Winston Barbosa Chacón
Universidad Industrial de Santander (UIS). Calle 9-Carrera 27 Bucaramanga, Colombia.
Tel.: +57.7.634400 Ext. 2622, Fax:
+57.7.6351090
E-mail: jowins@uis.edu.co

María Victoria Nuño Moral
Universidad de Extremadura, España.
Facultad de Biblioteconomía y Documentación
Plazuela Ibn Marwan – 06071 Badajoz, España
Tel.: 924 286400, Ext.: 86410
E-mail: mvnunmor@alcazaba.unex.es

Marlery Sánchez Díaz
Departamento de Ciencias de la Información. Facultad de Comunicación. Universidad de la Habana. San Pedro entre Ermita y Avenida Independencia. Plaza de la Revolución. La Habana, Cuba. Tel.: (053) 883 0293
E-mail: infctf@biocen.cu

Mary Eugenia Luna González
Ministerio de Petróleo y Minería
Av. Libertador con calle El Empalme, Edif. Sede Torre Oeste, piso 4 Ofic. 4-26. Urb. La Campiña. DC ZP 1050, Venezuela.
Tel.: 58212 70873114, 58412-9519607
E-mail: malunag2000@yahoo.com

Miguel Ángel Mateo Saura
Instituto de Estudios Albacetenses Don Juan Manuel. C/Amistad, 21 – 2ºB. 30120, El Palmar (Murcia, España).
E-mail: mateosaura@regmurcia.com

Commentary

Directions in online Library Science education

In the early years of the century we have begun to have a clear understanding that globalization, the knowledge society and information and communication technologies (ICT) entail challenges to institutions of higher education, exerting influence in educational models, workplace competencies and modalities of intercommunication taking place among the diverse segments of society. Moreover, it is evident that ICT are now one of the material foundations of the knowledge society, which itself has undergone changes making it distinct from other social groupings. The knowledge society contemplates socio-economic systems that require information technology expertise. Driven by these technological transformations, academic and social networks posit new research phenomena for library and information sciences, inspiring a paradigm shift with its foundation in education, information and knowledge. Currently, ICT is widely acknowledged as a medium that facilitates social communication and the acquisition of information and knowledge. Moreover, institutions are furnishing information professionals with a wide array of skills enabling them to meet the diverse information and documentation demands of society. This is so because:

- Information is an integral part of all human activity and its use is potentiated through ICT.
- Flexible technology allows organizational structures, educational models and information services to be reconfigured and modified, which are key foundations of the knowledge society.

- Technologies accentuate their convergence in a highly integrated system, which is a requirement of the knowledge society.[1]

On this stage, information is the key element allowing society to participate in processes of cohesion, globalization, informatization, education and creation of knowledge. Information and the exploitation of technologies are now thought of as the ideal media for the democratization of education, allowing its bounties to be delivered to ever broader sectors of society. In the early twenty-first century, as a result of scientific research, technological innovation, privatization and commercialization of knowledge, and the growing demands for more online education options, the teaching of disciplines has been transformed. This situation had led educational institutions to develop sustainable educational programs. In this sense, distance learning in virtual classrooms uses information, knowledge and technological media to encourage didactic dialogues between student and teacher.

Online education is seen as a viable alternative modality, largely because of advances in the science of psychopedagogy and ongoing technological innovation it entails. Online educational alternatives, driven in turn by globalization, trends encouraging curricular flexibility, the development of interactive learning approaches and implementation of technologies in educational delivery systems, are currently in a growth stage.

The virtual classroom is characterized by the convergence of methods, technologies, application and services aimed at facilitating and sustaining learning over the internet. To this end, training in online skills and abilities is fundamental. In this circumstance, learning theory, platform management skills and didactic material and learning object development are especially significant. Moreover, online education approaches must stress the following fundamental concepts and/or skills: learning theory, technological platforms, didactic materials, learn-

1 Manuel Castells, "La era de la información: economía, sociedad y cultura," *La Sociedad Red,* México, Siglo XXI Editores, 1999, 94.

ing object development, evaluation of content of online educational software, remote communication skills and planning of documental information services in accord with any specific online educational approach.

The ongoing debates surrounding online educational theory and methodologies have become more prevalent in the early twenty-first century. As cyberspace and virtual spheres have become permanent objects of study, researchers attempt to analyze the pertinence underlying online educational theories and emerging ideas for use in the virtual classroom. A common use of the internet in online educational environments is the creation and distribution of educational programs offering non-conventional approaches, in which global distributed learning opportunities are multiplied. In fact, the permanent use educational technology in online learning environments has been the subject of much debate in the specialized literature. These discussion have focused on, among other things, its implementation in societies because [...] its effects and scope situate it not only in educational information and communication, but also in the social, economic, legal and political foundations of society itself.[2]

It is quite clear that technologies drive all disciplines to assume new requirements, as the transformations of higher education induce change in society, modify how work is done and the ways in which the diverse sectors of society communicate. Because of the need to address problems associated with online education, diverse international organizations have taken up these issues. Consequently, IFLA, UNESCO, the International Association of Universities and the National Association of Institutions of Higher Learning (ANUIES), among others, have promoted research into non-conventional education approaches, leading to the following general consensus:

2 Julio Cabero Almenara, "Nuevas tecnologías, comunicación y educación," *EDUTEC. Revista electrónica de tecnología educativa*. Accesed 20/05/14, http://edutec.rediris.es/Revelec2/Revelec1/revelec1.html

1) The need for modular curricula to promote and consolidate life-long learning;
2) The accrued experience of distance learning universities demonstrates the significance of this learning modality and its effects in society;
3) Advanced technologies enhance the flow of communication among students and between students and faculty;
4) The development of high-level educational content requires significant capital, human and time investments. These investment, however, bring a wealth of benefits to online learning;
5) Interactive technologies have huge potential for improving learning media used in distance learning and for promoting social learning;
6) Online education transcends national borders, allowing it to reach students all over the world:
7) The educational infrastructure of universities allows them to collaborate internationally with diverse educational systems and the business world.[3]

Many of these university and institutional experiences inform projects currently in operation in Mexico. Additionally, coordinating institutions for online systems and programs across all grade levels have been instituted. We can also point to governmental policies to modernize by exploiting online modalities. These efforts, of course, exert structural, economic and constitutional impacts which provide coherence to overall social participation in education within the globalized world. Simultaneously, we see that many educational institutions have had to deal with the complexities and risks entailed in restructuring educational models and work practices traditionally oriented to classrooms filled with students in order to arrive at mixed approaches that includes online instructions and virtual classrooms. These changes owe everything, of course, to the advent of ICT.

3 Sarah Gari-Rosenblit, *Distance and campus universities: tensions and interactions. A comparative study of five countries*, s. l.: UNESCO, International Association of Universities, Elsevier Science Ltd. IAU Press Perganon, 1999. Tito Mejía Esparragoza, 240-242.

The supply of educational options is growing every day because the internet and Web 2.0 are used as the predominant communication channels and as the media for distributing didactic materials, learning objects and open access educational resources. Online education is situated in the educational content and technologies, and its central purpose has been to educate groups in the use of emerging technologies. Moreover, the use of Learning Content Management Systems (LCMS) has marked a trend in the online education market.

It is important to take into account; however, that while electronic education stresses the development and management of educational content, non-conventional learning seems to be pointed in the direction of development of content supported by the growing use of technological convergences, with special emphasis on effective academic interaction among stake holders, through the use of advanced navigation, intelligent tutorials and diverse communications channels to ensure independent study in a collaborative relationship within the virtual scenarios. As such, there is growing use of tele-processing and social networks in which information and communication technologies are increasingly process-oriented, and learning and socialization practices are focused on production, distribution, appropriation, representation, signification and interpretation of information and knowledge.

Online education models stress learning within collaborative scenarios favoring knowledge building dynamics. In this context, it behooves us to adopt the commitment to engage in active, planned participation, targeted educational intentions and shared pedagogical frameworks. To this end, theories underpinning online education and library science research focus on the pre-requisite elements for achieving advanced distributed education for the purpose of gaining a better understanding of the potential of these education modalities. Learning in virtual environments requires institutions, equipment and manpower to design, develop and manage certain processes in order to help students achieve their educational goals.[4]

4 Ibid., 65.

These aspects shall be increasingly at work in online education as the century advances, because of the diverse possibilities supplied by the internet and tele-processing networks. The latest technologies favor communication with students, and academic-administrative control and design of educational structures based on hyper-text and hyper media. The virtual classroom, video-conferencing, email, digital libraries also play key roles; as do open access depositories and metadata systems. The creation of selective bibliographic information distribution services using telecommunications allowing world-wide sharing of digital documents for educational purposes is also a reality and is something being exploited in the educational sphere because of advances in both pedagogical approaches and the implementation of cutting edge technology. This situation has driven the modernization of education through institutional and governmental programs whose purpose is to effectuate cultural, economic and constitutional changes, responding and providing coherence to the individual educational programs designed to propitiate the democratization of education, while addressing backwardness existing at the diverse educational levels.

Thus, globalization, and the information and knowledge society have influenced the growth of online education projects, as institutional awareness increases with regard to this modality hand-in-hand with the availability of requisite technological infrastructure. For Library Science, online teaching constitutes a rich area of research, because the field has yet to propose and develop solid online education approaches. This situation evidences the field's need of diversification, the creation of new training alternatives that take into account the growth of knowledge and the demands of the labor market; while incorporating new information and communication technologies for production and dissemination of new knowledge, carrying out ongoing innovation of teaching methods and techniques and performing basic applied research.

The knowledge societies have caused universities to undergo a significant increase in enrollment. This is coupled with even greater demands to respond to scientific and technologi-

cal advances, globalization, the demands of society for quality and efficient education, the internationalization of higher education and of the academic labor market, the integration of research and education and other phenomena. Everything indicates that the milieu of Library Science teaching will entail an agglutination of available knowledge for the purpose of supplying the student a professional education that allows him to understand the effects of globalization and the purposes of the knowledge society, thereby allowing the student to develop the competencies needed to succeed professionally in a labor market undergoing constant change. What is needed, then, is to address teaching on the basis of logically weighed priorities, in order for students to understand Library Science phenomena, and identify and solve problems.

These demands will require the Library Science professional to master the competencies entailed in identification and description of cultural, social and economic scenarios in which diverse technologies are used. The professional will also be expected to possess adequate management skills with regard to such phenomena and to be skillful in designing proper information systems using appropriate applications to meet the demands of information users. Any program associated with Library Science should know that the social context must characterize the technological applications, and not the other way around. Experience demonstrates that technologies exert direct effects on the social context they come to inhabit.

In this sense, it is important to acknowledge that [...] the capacity of the library and librarian to respond to the requirements of users and to access, locate and supply them relevant, specialized information is a central determining factor.[5] With the use of information and communication technologies, the development of new skills and abilities becomes paramount. Library Science is being called to deploy high level academic teams, fully trained in research, and creation and communication new knowledge for the purpose of designing modern

5 Saadia Sánchez Vegas and Estrella Pérez, "Reflexiones sobre la formación de recursos humanos de cuarto nivel en el área de las ciencias de la información," *INFOLAC* 9 (October-December 1996): 4.

information systems based on ICT. These elements are part of teaching and research in the discipline, because competent information professionals are needed in educational institutions, governmental agencies, private companies, industry, etc.

Through study of the ways in which information, knowledge and diverse documentation resources are exploited in diverse kinds of communities, these professionals must acquire the competencies required to lead projects targeted at helping society achieve meaningful interaction with information and knowledge. At the same time, these professionals are duty bound to continue with the learning process and sustain ongoing interaction with the information needs of users. This, of course, will require a broad range of skill and competencies. In the current dynamics, these actors are required to drive the development of libraries and promote contact with users in order to meet growing information demands as fully as possible.

The emerging proposal associated with Massive Open Online Courses (MOOC) must be addressed in terms of Library Science research and education, in the understanding that these courses require highly specialized content and are imparted without tutors or advisors; and that they attempt to exploit collaborative learning while using instantaneous assessment in the absence of educational models supported by learning theory. From these observations, one can deduce that the development of the MOOC proposal is an alternative educational model in that it can promote research directed at individual and collaborative learning, the development and use of open access contents, massification of training, distributed learning social networks, greater use of the cloud, application of mobile technologies and teaching methods targeted at mass audiences in virtual learning environments.

For the purpose of pertinently addressing the study of this modality in its totality and full complexity, online library science research shall occur within a multidisciplinary context, because it requires approaches that exploit educational models, educational communication, new pedagogies, ICT, interactive virtual scenarios and more. These endeavors will require di-

verse disciplines, theories and methods to contribute to problematizing educational research of this kind.

Roberto Garduño Vera

A R T I C L E S

Extraction of candidate terms from a corpus of non-specialized, general language

Gilberto Anguiano Peña *
Catalina Naumis Peña **

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Abstract

Linguistic phenomena associated with the analysis of document content and employed for the purpose of organization and retrieval are well-visited objects of study in the field of library and information science. Language often acts as a gatekeeper, admitting or excluding people from gaining access to knowledge. As such, the terms used in the scientific and technical language of research need to be kept up and their behavior within the domain examined. Documental content analysis of scientific texts provides knowledge of specialized lexicons and their specific applications, while

* El Colegio de México, México. ganguia@colmex.mx
** Instituto de Investigaciones Bibliotecológicas y de la Información de la UNAM, México. naumis@unam.mx

differentiating them from common use in order to establish indexing languages. Thus, as proposed herein, the application of lexicographic techniques to documental content analysis of non-specialized language yields the components needed to describe and extract lexical units of the specialized language.

Keywords: Content Analysis; Term Extraction; Scientific Language; Corpus of General Language.

Resumen

Extracción de candidatos a términos de un corpus de la lengua general
Gilberto Anguiano-Peña y *Catalina Naumis-Peña*

Entre los objetos de estudio de la Bibliotecología e Información se incluyen los fenómenos lingüísticos asociados al análisis de contenido documental tanto para organizar la información como para recuperarla. Para ello, se deben rescatar los términos usados en el lenguaje científico y técnico, estudiar su ámbito de dominio y comportamiento. A través de la lengua se controla y se excluye el conocimiento que una población pueda obtener. El análisis documental del contenido, en este caso de los textos de difusión científica, permite obtener un conocimiento de las unidades léxicas, sus aplicaciones significativas y separar los términos de la lengua general para crear lenguajes de indización. Es así que por medio del análisis de contenido documental en un corpus de lengua general marcado con los métodos de la lexicografía se obtienen y caracterizan los componentes que permiten extraer unidades léxicas del lenguaje especializado mediante las técnicas propuestas en el presente trabajo.

Palabras clave: Análisis de contenido; Extracción de términos; Lenguaje científico; Corpus de lengua general.

Introduction

The general objective of this paper is to determine the methodologies and strategies for processing a linguistic body of a general language to obtain the specialized terms used in a field and the terms shared among several fields, and thereby separate them automatically from the mass of lexical units of the general language. This kind of work allows terms to be obtained and their meanings later clarified. It also allows one to learn of the uses of the texts in which such terms appear and use these terms in the construction of documental languages.

Is the language of science a secret language? In a digital newspaper in Murcia, Spain, the following scientific dissemination article was published: *El lenguaje secreto de la ciencia*, whose author contends: "[S]ince algebra all the way to geometry and on to aerodynamics, mathematics have been at the center of all scientific inquiry and are now basic to our daily lives" (Moreno, 2011. Translated from Spanish); thereby suggesting that mathematics is the secret language permeating all science. The Research into basic mathematics she presents justifies this asseveration is supported by maths professor Manuel Saorín, who states: "Withdrawing money from and ATM or sending an email would not be possible without algebra" (Moreno, 2011. Translated from Spanish). Doubtless, he is not referring to the clarity of the terms used in science to communicate information; yet an attitude of complacency can be observed with regard to the use of language hidden in the language of science.

This causes one to reflect on the fact that nowadays humanity enjoys many valuable resources and new technologies allowing us to acquire and disseminate information. These technologies include telecommunications, radio, television, telephony, data transmission, and interactive digital books, etc. Of course, the internet, with its bourgeoning social media applications, is the most outstanding of these new technologies, allowing human beings to enjoy access to global knowledge from mobile phones, tablets, laptops and televisions, etc.

This access has been possible for many years. So, how is it that science and technical knowledge are growing and spreading, but the world's population has not exploited it to improve its well-being? The answer is that there

is a sort of functional illiteracy[1] that does not allow a large segment of people to decode the meaning of many scientific dissemination messages, which is exacerbated by the use of terms that are unknown to the general population, something that should be addressed by actions such as those proposed by López-Barajas (2009) regarding virtual literacy.

The essence of the problem is patent when a population needs to understand certain terms, phrases or sentences contained in scientific literature in order to fully understand meanings, but fails to do so. Consequently, these persons are barred from the benefits of the scientific and technological knowledge, which appears to them as something impenetrable, obscure and distant, thereby reinforcing the notion that science is a secret language.

This is nothing out of the ordinary because scientific communication requires interlocutors to possess the basics of encoding, decoding, interpretation and transmission of scientific and technical messages. Those without these basic skills are automatically excluded from specialized communication between senders and receptors of such messages, as described by Sánchez González (2010). The problem is that the lack of clarity seems to be repeated in dissemination texts comprising the linguistic corpus of the general language. The *Corpus del Español Mexicano Contemporáneo 1921- 1974* (*CEMC*) provided the baseline for this study. This work contains scientific dissemination formal education texts at the undergraduate level in which specialized terms appear that are recovered from the mass corpus to be analyzed. This work does not address the semantic aspect of terms. It focuses exclusively on the methodology for teasing such terms out of the general language.

Focus on communication and other aspects of the text

Library and Information Sciences hold that in order to aid users to access information, the starting point must always be the notion that communication of a knowledge laden message depends entirely on grasping its mean-

1 Jiménez del Castillo defines this term thus: "The functional illiterate is a person who presented with information (or knowledge in alphabetic code) is incapable of putting it into operation through consequential actions. In this sense, we say that such a person does not possess the ability to process the information in a way that society to which he belongs expects" (2005: 290. Translated from Spanish). With regard to technology, Wikipedia provides this perspective: "The condition of functional illiteracy also seriously limits the quality of interactions a person can achieve with information and communications technologies, and their abilities to use efficiently a word processor, spread sheet, web navigator or mobile phone. ("Analfabetismo funcional", 2014.)

ing. In this light, one observes what happens with the linguistic sign and its components: i.e., signifier, referent and signified, in order to achieve effective communication.

Where texts are involved, as is the case with Library and Information Science, one must establish that there are several inherent facets to the need to communicate something, as explained by authors such as Luis Fernando Lara (1977, 1984, 1996, 1999, 2001; and Jetta Zahn, 1973), Ana María Cardero García (1998, 2003, 2004, 2005 and 2009) and Catalina Naumis Peña (1997, 1999, 2000 and 2003) in Mexico, and foregin specialists such as Juan Carlos Sager (1993), Juana Marinkovich (2008), Rosa Estopà (1998), Rita Temmerman's (2000) in the socio-cognitive theory of terminology; and María Teresa Cabré and Rosa Estopà (2002); and finally María Teresa Cabré (1999a, 1999b, 2002), who posited two proposal regarding the Doors Theory and the Theory of Communicative Terminology (TCT). These specialists argue that one must take into account the context in which a lexical unit is used and its correlation with the rest of the language in order to understand its true meaning, something which in itself is framed by the consensus of native speakers.

If the theories of these specialists are deemed pertinent, one must then admit socio-linguistic concepts, including situational context, field, tenor and mode (Halliday, 1979), along with quantitative urban sociology or *variationist theory*[2], which acknowledges the socio-economic and cultural status of the speaker. As such, the act of communication in scientific language will be shown to be comprised of spatial and temporal circumstances and this requires the linguistic context of the text, those factors associated with the production of an utterance, to be taken into account, for this context will affect the interpretation, propriety and meaning of the message, in terms of grammar, syntax, lexicon and context. One must also take into account the extra-linguistic context or situation, which is the subset of potential participants in the communication, including place, type of register and moment in which the linguistic act occurs.

The study and maintenance of linguistic registers is very important to the task of clarifying terms, because it includes the subset of contextual and socio-linguistic variables that modulate the mode in which the language is used in a concrete socio-linguistic instance. That is to say: analysis of a linguis-

2 "*Urban quantitative sociolinguistics* or *variationism* (this field studies the linguistic variations of a speaker or community of speakers in the context of social factors)". (*DTCE*, 2014. Italics in the original. Translated from Spanish).

tic register defines whether the communication is deployed as standard language or in a non-standard, cultured or sub-cultured usage; and whether it is formal or informal in nature (among other possible usages), as can be seen in *Corpus del Español Mexicano Contemporáneo, 1921-1974* (CEMC) (Lara and Ham Chande, 1979: 7-39), from which the results used in this study were obtained.

Similarly, when scientific texts are analyzed, it is important to indicate that science is kind of communication based on registers of formal use and situations, where the sender selects the appropriate linguistic resources, using specialized registers, targeted to a receptor whose nexus is shared interest in the specialized activity of a specific profession. These characteristics help differentiate it from the registers belonging to other socio-cultural fields such as the one studied in this case. A professional exchange is characterized by the use of its own technical vocabulary and expressions carrying special meaning, very often these messages are written. In real life, scientific authors, however, cannot in reality send a message as Wüster (2003) would have it in his General Theory of Terminology (GTT), by using only specialized terminology of the specific discipline; since they also need to employ lexical units from the general language and units belonging to other specialized disciplines.

This type of lexical analysis must select authors who are recognized as authorities in their respective fields. These authors shall be highly productive and widely cited. One must also take into account the author's place of birth, socio-economic status, life experiences, culture, ideology, religion, political leanings, verbal tradition, language, professional training, individual and team research, experience, freedom of expression, individual interests, current relevance, scientific specialty and type of documents or texts produced, which may include letters, memoranda, reports, degree theses, research reports, articles, books, conference scripts, resolutions, standards, laws, regulations or dissemination papers.

To situate this production of terms to be analyzed from a documentary standpoint, one must identify the type of document or scientific text, establish if it comes from an authority in the field and whether it represents spoken or written language, if it was written in a hurry or subject to several drafts or whether it was a free discourse or commissioned work to name only a few aspects to be weighed. One must also consider the use of specialized expressions, because scientific authors generally employ diction meticu-

lously in order to reduce ambiguity. The author, however, may or may not be successful in this endeavor, because the mind may have many reasons for choosing one lexicon or set of terminology over another. These motives can include situational factors entailed in drafting the discourse, the language used, the correct use of nomenclature, proper names, abbreviations, acronyms, signs, fixed idioms, codes, passwords, concepts, numbers (in numeral form and written out), symbols, formulas, conventions, etc.; all of which may or may not favor the deployment of a terminological unit in specialized texts. As can be seen, many factors can influence and author's word or term choices; since there are simple forms, syntagmas, fixed expressions or phrasal construction. Other types of information of greater proportion entailed in specialized academic and technical texts may also be added to all of this. This later type of information includes citations and transcriptions revealing the existence of a large number of mentions by others, whether in terms of thoughts or scientific proofs (Cunha, 2014). Many times these data appear in the original language, such as Latin, Greek, English and French, etc. and are included in the bibliography and/or footnotes.

Content Analysis

It is time to situate ourselves in the idea that in order to solve scientific problems, scientific research uses analytical techniques that are field specific. The field of Library and Information Science employs several techniques that are complementary or similar to analytic methods. Of course, there are many disciplines that could contribute to this matter, but the fields of Linguistics, Applied Linguistics and Computer Science are much closer to the point.

These fields, moreover, are often involved in multidisciplinary studies of, for example, content analysis, discourse analysis, grammatical analysis, qualitative analysis, analytic definitions analysis, contrastive phraseological analysis, lexicological analysis, document analysis, conceptual relationship analysis, analysis of texts, syntagma unit analysis, analysis and design of linguistic corpus, term analysis and, finally, the method of document content analysis used for sending information.

In the introduction to *La ciencia del texto: un enfoque interdisciplinario*, Teun A. Van Dijk explains to what degree discourse analysis uses an interdisciplinary "transversal connection." Van Dijk starts with the assumption that language interactions achieve communication and meaningful exchanges

through texts and discourses. Linguistics studies a part of language use, but other sciences do the same, including socio-linguistics, communications, cognitive psychology, pedagogy, jurisprudence, political science, sociology and, of course, Library Science. The textual and discursive relationships occur between diverse kinds of texts, the underlying textual structures, their diverse conditions and functions, contents and effects produced in the speakers (Van Dijk, 1992: 9-10).

The diverse types of texts and the relationships between them and society exhibit connections of diverse kinds in accord with the field from which they issue. Science examining texts is interested in grasping the common properties and characteristics in the use of language across the spectrum of fields comprising the social sciences and humanities.

The area of information analysis and systematization within Library and Information Science is manifested in the act of describing text types, data and informational content whereby such texts can be located in the systems. The use of processes in common with other disciplines, however, is undeniable. This study, in fact, shall use terminology and lexicographical analysis.

Documentation in Lexicography

Document analysis as presented by Rubio Liniers (2004) is also applied in the field of Lexicography, because it is a part of the process of creating dictionaries. Gómez González-Jover (2005) stresses that this method is indispensable in the task of representing content of documents comprising a corpus in which lexicographic units defined in the dictionary are included. The representation of contents performed allows users to consult and retrieve from diverse points of access. Moreover, the results of this type of analysis can almost always be used to create new lexical information products, such as concordances, statistical data, indexes and dictionaries.

Document content analysis aids user to decode messages and the retrieve relevant information from the document system of the *Diccionario del español de México* (*DEM*).[3] This situation is supported by the fact that the author has already emitted his message and it is contained in the documental sup-

3 This Project was launched in 1973. As stated by Barcala Rodríguez (2010) for other corpora, the *DEM* structured a system of lexicographic retrieval on the basis of the Linguistic Corpus.

port, largely in written texts belonging to the same specialization. As such, it is the job of information centers to ensure that the content of these documents, which may be be candidates for terms, are available to and easily retrievable by users.

The preparation of *DEM* rests on the basis of a Linguistic Corpus, which establishes the guidelines for maintaining and offering a great capacity and versatility in the management of the information it contains. Like any other information system, the Linguistic Corpus defines entries and access points that must be included. Even though nowadays there are multimodal corpuses (voice, image, text, etc.) the corpus generally used up until recently by science and technology has focused on the diverse modalities and features of words or lexicons contained in both general and specialized languages. In the case under study here, this is applied to support scientific dissemination communication.

The documental process in lexicography requires basic compliance with certain steps such as:

- Planning activities, entailing setting goals and objectives, and the organization and methodology to be implemented.
- The selection and acquisition of the documents, including making transcriptions of oral reports.
- Treatment of documents in terms of physical appearance, which implies physically preparing the material in order to obtain the corresponding file for later analysis.
- Drafting the bibliographic description of the document, highlighting the points of access allowing its identification with regard to other documents. For printed texts, this description includes author, title, legal notice and physical description of the material. The lexicography also includes external data of interest to the fields of socio-linguistic, pragmatics and semiotics, data which generally correspond to the communication unit analyzed in which the issuer, the situation from which the communication occurred and the channel used are highlighted. There is also an extra-linguistic context or register of speech by which formality or informality of written documents can be distinguished. This is also useful in understanding the target audience, i.e., whether it is for general readership or specialists. From the subset of register, the subsequent situational and thematic identifications with regard to the lexical units are performed. Consequently, this aids us-

ers of the system assign meanings to the lexical units contained in the information retrieved.

- With regard to the text or the strictly linguistic context, texts written in a scientific discipline generally must exhibit the components of the linguistic sign (signifier, signified and referent), with the smallest portion of text consisting of a paragraph separated by a period and return, or one item. Texts are analyzed by means of programs and algorithms previously determined for the purpose of gathering information from the document. In general, this analysis brings forth the graphic forms of words or lexical units, just as they are found in the texts of the natural language, whether common or specialized.

In Library and Information Science, where indexing is done with the natural language, the term is isolated from its context. A textual analysis approach is used[4] to analyze the scientific document and later a documental analysis is made of the content, with the indexing of natural language as the central objective, whereby the same text is used to extract indexing terms. This process supplies lists of signifiers or lexical units separated from their signifieds and referents. In this way the linguistic sign is fragmented, which complicates the user's retrieval efforts and necessitates additional search support.

In contrast to this method, the extraction of terms to constitute a linguistic corpus provides different lists, comprised of simple or compound words with their respective designation of part of speech, morphologies, internal structures, syllable divisions, placements, phraseological units, compound syntagmas, phraseological utterances, meaningful worlds, key words, vacuous words, technical terms, neologisms or term candidates.

In general terms lexical units obtained from a linguistic corpus are accompanied by quantitative data (range and frequency) and the contextual origin can be identified by means of usage register, especially when such units come from specialized language.

4 An *ad hoc* corpus can be made, or commercial text analysis programs, such as *WordSmith, AntConc, Notepad, Atlas.ti* and *Sketch Engine* can be used.

Terminological exclusion using general language subsets

When one wishes to extract term candidates from general or specialized texts, it is useful to keep in mind the information that already exists on the lexicon in infometric, bibliometric, scientometric and lexicometric studies. The Luhn cutoffs and the determination of TF-IDF weights (Blázquez Ochando, 2013) must also be considered in order to filter out common language usage and retrieve the term candidates

In addition to the indicator cited above, this article proposes that other similar indicators based on natural language can be employed to exclude subsets of general language. These indicators include fundamental vocabulary (similar to a frequency index and the Zipf model), common lexicons (based on the dispersion index) and lists of grammatical words (the equivalent of empty words) for the purpose of achieving maximum isolation of the specialized units searched for in the text. This is to say, the lexicographic knowledge produced by the *DEM* project and its *Corpus of Contemporary Mexican Spanish 1921-1974* (*CEMC*, 1975), can be reused to simplify the information one wishes to analyze.

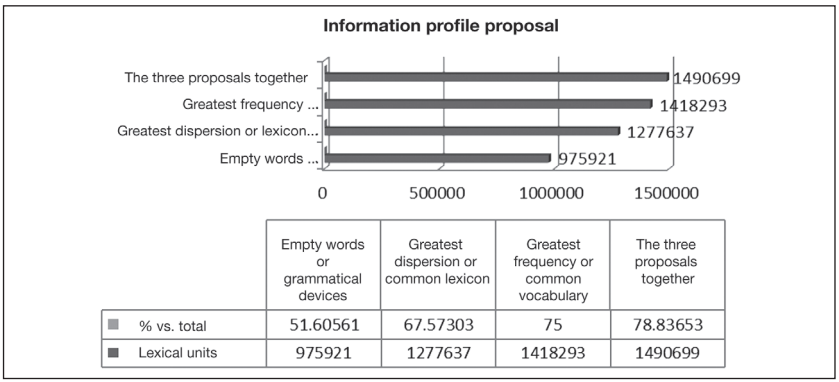
These pages use some of the results of the content analysis of *CEMC*, which is comprised of nearly two million grammatically labeled words. This corpus, in turn, supplied a lexicographical product, which properly speaking is a statistical index of natural language with lexical, grammatical and sociolinguistic information, as well as records of language usage and quantitative data. This product is called the *Diccionario estadístico del español de México* (*DEEM*, 2005). The results obtained from DEEM regarding empty words, greater dispersion and greater frequency are as follows:

1) Grammatical lexical units or *empty words*: These are largely articles, preposition, interjections, pronouns, etc., adding up to 292 lemmas and accounting for 51.60% of the total information in the corpus. This is the third group of terms to be excluded when one attempts to extract scientific and technical terms.
2) The lexical unit exhibiting greatest dispersion or the most *common lexicons* (Anguiano Peña, 2013a): These units consist of 994 distinct lemmas and account for 67.57% of the total corpus. Upon performing a search of specialized terms, these kinds of lexicons tend to be separated out from the document content analysis.

3) The lexical unit most frequently used or *fundamental vocabulary* presented by Lara (2007): In this category one must be aware of the phenomenon of economy of language known as "least effort," identified in lexicometric and infometric studies and the Zipf model (Zipf, 1949), among others. This concept describes how people use an enormous number of graphic words that correspond to a small number of lemmas, which results in a very small number of lexical units with very high frequency of use. In line with this reasoning, we understand that fundamental vocabulary, i.e., that which is most frequent, is the vocabulary most often exploited in texts and discourses. In the *CEMC,* 861 lemmas account for 75% of the total of the information of the corpus. We suggest that this type of lexical unit also be eliminated.

Figure 1 and *Table 1* show the significant savings secured over these three headings, which is why they were excluded from the analysis.

Figure 1. Proposed cutoffs: empty words, most frequent, most dispersed and the three together, against 1 891 058 lexical units (%) Source: Created by Gilberto Anguiano Peña for doctoral thesis (2015)



Source: Gilberto Anguiano Peña for PhD dissertation (2015)

Table 1. Summary of Empty Words and lexicons with greatest frequency and dispersion, and all three together

Concept	Graphic words	% of total
Empty or grammatical words	975 921	51.60561
Greatest dispersion or common lexicon	1 277 637	67.57303
Greatest frequency or fundamental vocabulary	1 418 293	75
The three proposal together	1 490 699	78.83653

Source: Gilberto Anguiano Peña for PhD dissertation (2015)

As can be observed, the value of three groups taken together is not the sum of the three groups, because there are lexical units that belong to two and even three groups. Because the combined value stands at 78.83% of the global information analyzed, this recommends the implementation of filters using general language before attempting an analysis of content. In this way, there is a savings of nearly 80% in the retrieval of term candidates, which is in line with calculations presented in other information retrieval studies. Moreover, in order to retrieve scientific and technical terms more efficiently, a minimum number of valid appearances is set. In this way, those lexical units that appear very infrequently and with scant literary warrant are filtered out.

Documental process of disambiguation of meanings and defining the use of candidate terms

This paper proposes the following process for retrieving a text in which a user is interested: After the index of signifiers is obtained, which is the same as terminology candidate list, these are simplified and lemmatized. Then one must retrieve each as per the use register within the thematic area the document analyzed belongs to and in which it was documented. In practice this would be something like signaling the lexicon available in the text.[5] In this way, the user receives help in "clearing up ambiguity of meaning and finding the proper use of certain voices" (Estopà, 1998: 360. Translated from Spanish), and the user may subsequently request the information retrieval system to provide the referent closest to the search query by simplifying the search to a minimum. Any such effort notwithstanding, the real meaning shall always depend on the reader's interpretation.

Much like the Library Science indexing process, the term candidates or key words can be adjusted to a controlled language in order to improve content retrieval. This can be done through the use of subject headings or thesauruses. In this way the words of the natural language are converted from the indexation of expressions and concepts acquired from a controlled language. At the end of the documental process, information is released to the users so they might appropriate it. Documental analysis in lexicographic

5 In the view of López Morales "The *available* lexicon is the subset of words speakers possess as mental lexicon and whose use is contingent upon the concrete topic of the communication. What we want to know is which words a speaker would be capable of using in certain themes of communication" (2013. Italic in original).

projects supplies diverse informative products which are targeted to internal and external users. These may be separate or combined as a system. The components can be a data base of concordances, like the *Key Word in Context* (KWIC), quantitative information, document card catalogues, the dictionary being prepared or the distinct interfaces for consulting lexicographical information.

As part of the long process of documentary text content analysis from the lexicographical standpoint, what one expects to obtain after concluding the indexing and classification by natural language is a list of lexical units that are meaningful in both the general language and the scientific-technical sociolect. This can be expected because of the inclusion of texts from such specialized fields.

Exploitation of use markings from lexicographical documentation

The *DEEM* results provide the basis to build another data base: the *Sociolinguistic lexicon model of Spanish used in Mexico* (Anguiano Peña, 2006). After assigning a semi-automated index to the lexical units of the *DEEM*, a summary of partial results of the previous data base was possible; and with the completed data, the total results of the lexical unit used in the general language in Mexico could be identified by means of their socio-linguistic registers (*Table 2*).

Table 2. Sample record used for identifying term candidates in the sociolinguistic model

Lemmas	Part of speech	Total Frequency	% total	Use of Spanish	Language level	Speech registers	Most frequent	Best distribution	Text key	Use registry 1	Use registry 2	Use registry 3
acción [action]	nom	4	0.00021	standard	cultured							
actitud [attitude]	n	259	0.01370	standard			basic vocabulary					
activación [activation]	n	14	0.00074	standard	cultured	science			420, 427, 428, 454, 469, 473, 477, 478	Chemistry	Medicine and veterinary med	Medicine
activado [activated]	adj	2	0.00011	standard	cultured	science			389, 478	Electronics and electricity	Medicine	
activamente [actively]	adv	12	0.00063	standard	cultured							
actividad [activity]	n	511	0.02701	standard			basic vocabulary					
activista [activist]	adj; n	6	0.00031	standard	cultured							
acto [act]	n	308	0.01629	standard			basic vocabulary					
actor [actor]	adj; n	133	0.00704	standard								

Source: Gilberto Anguiano Peña for PhD dissertation (2015)

Proposal for limiting term candidates

For the purpose of specialized information search and retrieval and on the basis of previous analysis of documental content of general and specialized texts, we propose eliminating the following data originating in the quantitative data and use marks of the general language:

- The most frequently used lexical units
- The most widely dispersed lexical units
- Lexical units belonging to the empty words group
- Lexical units in a non-standard language
- Lexical units deemed uncouth

If this list of quantitative and socio-linguistic lexical units are filtered out of the analysis, the process of retrieving term candidates can be streamlined considerably. What is important is that once a list of such elements is secured it can be compared to the registers of the use of language that already exists in the S*ocio-linguistic model of the lexicon of Mexican Spanish.* This comparison will help both the information user and the Library and Information Science professional to reconstruct the meaning of the linguistic sign and the creation of a controlled language. This new comparison can find term candidates used exclusively in a field, which would prove they are key words and could become terms in the strict sense after expert verification. Consequently, candidates used in two or more fields can be recognized, indicating they are terms in the broad sense and in fact may have multiple meanings, which in lexicography means that are technical terms. We may also find candidates that belong to science that are also technical terms. These could be considered technical terms, but dictionary entries may include the label "Scientif." indicating they belong to scientific language.

This paper also proposes the reuse of lexicographic processes to differentiate lexical units and extract these through content analysis of specialized texts, employing usage markings or speech registers as posited by Josette Rey-Debove (1971), when she examined three fundamental aspects for achieving this goal:

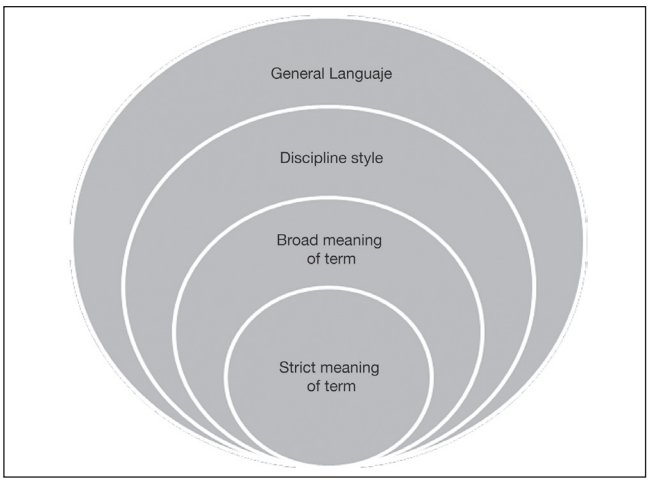
1) The subset of words (lexical units) belonging to a language or dialect.
2) The socio-linguistic information of the lexical units.
3) The consensual usage markings made by the community of speakers.

The aim of incorporating these guidelines in the information analysis is to have the same lexical units of the general language, identified by consensus and standing in contrast to the specialized language, serve, in the first place, to classify technical terms.[6] Since these terms behave similarly to terminological units, they can be designated term candidates.

Text search of terminological units

To obtain specialized terms with the help of a corpus such as the aforementioned model, one must first separate the term candidates with registers of usage in a specialized text. During this stage of the term search process it is common to find lexical units in the lists produced by automated analysis that belong to a discipline across several of its communication levels, even though all these units belong to the standard language, to cultured usage and a to a science or technical field. This means that the content analysis can provide the following lexical units from a general or scientific text: 1) Units that belong to the general language. 2) Units belonging to the style of the field under analysis. 3) Term candidates in the broad sense, and 4) Term candidates in the strict sense, as shown in *Figure 2*.

Figure 2. Lexical units in the documental content analysis of a text



Source: Gilberto Anguiano Peña for PhD dissertation (2015)

6 From the standpoint of linguistics, a term is deemed "technical" in accord with the following definition: "Technical terms. *n*. 1 Any term that has a concrete and specific meaning within the language of a trade, science, art or industry: the word "algorithm" is a technical terms from the field of mathematics." (*DMLE*, 2007. Translated from Spanish.)

In order to take a deeper look at the proposals made in the previous paragraph, the following observations are in order:

1) While also identified socio-linguistically as belonging to standard usage, non-standard usage, uncouth usage (vulgate) and cultured usage –which is to say they are not exclusive to science or technology– the lexical units that belong to the general language and also appearing in scientific and technical texts should be excluded from the term candidate list.
2) Lexical units belonging to the characteristic writing style of the field under analysis. These units generally belong to the verbal tradition of the field and consist of stock phrases and utterances. They appear at a in the text analyzed at very low frequency, but they are characteristic features in certain scientific fields. As such, it is best not to exclude them before performing the content analysis. These units may include set phrases and Latinisms, etc.
3) Specialized lexical units or technical terms. These are used with very narrow meanings in the field to which the text under analysis belongs. Such units may have the same signifier in general usage or in other fields; which is to say, they can have synonyms. This type of lexical unit will have an entry in the dictionary of general language,[7] and are in fact terms in the board sense.[8] The forms of graphic words, as they appear in the original text, are generally few and include the cases of masculine, feminine, singular and plural. Documental content analysis finds these words appear very infrequently in the common language, but as lemmatized lexical units (words grouped under their canonical form) they attain an additional percentage above the total of the sample analyzed. In other words, a small number of lexical units are grouped in a high number of lemmas. As for the dispersion index in *DEEM*, we observe that while such units are concentrated in a given field, they may appear in other scientific or technical fields or otherwise belong to scientific language bridging both areas of knowledge. These can be recognized, because even while having an acknowledged signifier, they have a meaning distinct from that ascribed in the natural language. As such, the average reader does not grasp the meaning and the term will seem obscure or secret. These

7 Such as in *DRAE* (2001) or *DEM* (2012).

8 In this study the term is used in its broad sense. Cardero García's proposal (2004: 42-43. Translated from Spanish), contained in a work on the control of satellites, argues that technical terms are "[…] designations from the general language that specialize their signified or designations that are common across several areas of knowledge […]". This would correspond to an infrequent signified with a frequent signifier.

units can appear in simple form of in phrases as syntagmas, set phrases or phraseological units

4) Term candidates in field under study. In documental behavior, these units are very similar to technical terms, but they do not have synonyms and presuppose a single, unequivocal meaning. These units belong to standard usage and are cultured. They are used exclusively in science or technology and have a formal register for exclusive use in the specialization. As such, they do not have meaning or equivalent in the common language. These candidates may take the form of simple or compound lexical units. In principle, candidates may be considered key words and once validated by an information specialist they may become part of the documental language. In the best of cases, they may become terms of a field in the strict sense.[9] In text analysis their frequency of appearance is low, but when these lexical units are grouped they have a high percentage of lemmas. They are without dispersion because their data are concentrated in a single filed.

In view of these considerations and the proposal of Cardero García (2004: 37), we can also expect that any documental content analysis of a general or specialized text will very likely exhibit lexical units with the features (in terms of signified, signified and communication type) shown in *Table 3*.

Table 3. Features of lexical units analyzed

Signifier*	Signified**	Language type
A common signifier	and a common signified	These are part of common usage.
An uncommon signifier	and a common signified	This would be a technical term of signifier, for example: *close up, stock shot, feidear.*
A common signifier	with an uncommon signified	This is a technical term in the broad sense; for example, bobbin winder, optical, camera.
An uncommon signifier	and an uncommon signified	This would be a technical term in the strict sense; for example, magnetic eraser, projection lamp, translucent screen system, animation technique.

* Signifier is that which indicates something. In this study it is a word or lexical unit given to a person, animal, thing, or tangible or intangible concept, and/or concrete or abstract object for the purpose of distinguishing it from others.

**Signified is the object indicated by the signifier. For our purposes, it is the mental concept or representation of something.

Source: Gilberto Anguiano Peña for his PhD dissertation (2015)

9 We can take also what is proposed by Cardero García (2004: 43), who views strict a term as belonging exclusively to a single discipline, and consequently an infrequent signified and signifier.

Despite the coexistence of lexical units and terminological units in a scientific text, it is possible to differentiate these by examining speech register in order to tell whether it exists in a form of communication or in a text belonging exclusively to a specialized language; that is, by verifying that they are products of formal communication used by specialists of a given field in order to ensure effective communication among them. As can be observed in the description of the process performed and described in the previous paragraphs, the lexical units analyzed are drawn from an empirical lexicographical study, which shows that something similar to that which occurs with general language texts also occurs with texts from the specialized language, in that both types of texts are comprised largely of lexical units from the general language. Even though it may seem to be the contrary, these differences are actually useful in the task of information retrieval, because the terms one wishes to extract from texts are not part of the common language.

Illustration of this type of analysis performed with the Model

In accord with the proposal herein and by isolating the lemmas corresponding to science and technical fields contained in the Model, the following results were obtained:

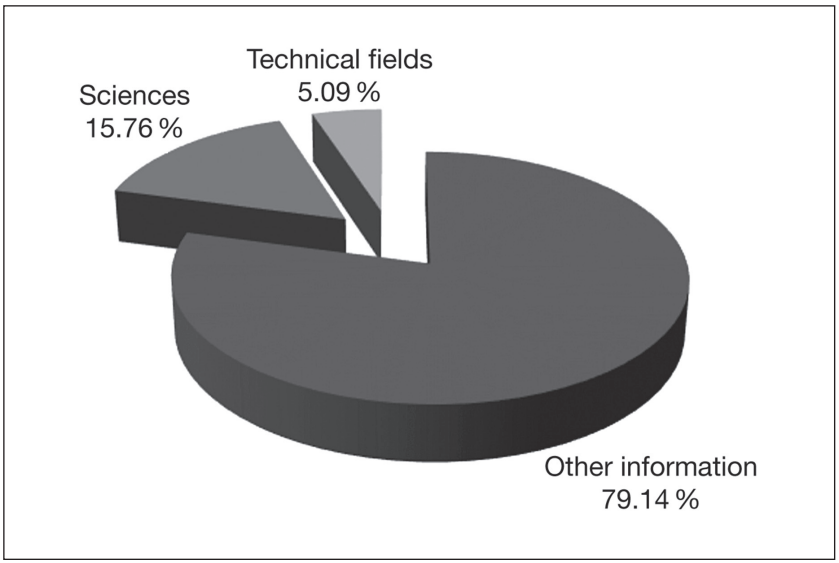


Chart 1. Of a total of 30, 899 lemmas (words that could be headings in a dictionary entry with associated definition) assigned in *CEMC*: 4,871 science lemmas and 1,574 technical lemmas were retrieved as terms candidates.

The *Chart 1* is derived from 30,899 lemmas in general use. To obtain the corpus of 15.76 % of terms exclusive to science, the lemmas were restricted twice (See subsection 4 of the Section: "Text search of terminological units"). First the 30,899 lemmas were reduced to 16,296 lemmas within the field of science and trades. From this number, the lemmas exclusively used in science and technical trades were drawn. The 6,450 lemmas used exclusively in these areas constitute 20.85 % of the corpus of lemmas.

Final considerations

The Model shown here, or other lexicographic resources with similar features, can be useful in the near future for computer assisted indexing or as a corpus monitoring resource in new analyses of specialized texts or of a corpus. Its use will allow rapid generation of signifier term candidates, which can also be useful for representing and retrieving content from the original text. These will also be valuable in the development stage of controlled language when working on terms, uniterms, subject headings or descriptors comprising the terminology of a given discipline analyzed in this way.

Moreover, it is important to understand that natural language and specialized language are constantly evolving, which makes it difficult to control and retrieve specialized language and associated terminology; but this is all the more reason for Library and Information Science to be involved in aiding users and readers decode the language of science.

Works cited

Aguilar, C. A.; Alarcón, Rodrigo; Rodríguez, Carlos and Sierra Martínez, Gerardo (2006), "Reconocimiento y clasificación de patrones verbales definitorios en corpus especializados." In *La terminología en el siglo XXI: contribución a la cultura de la paz, la diversidad y la sostenibilidad*, edited by María Teresa Cabré, Rosa Estopà and Carles Tebé Soriano, 259-269. Barcelona: Institut Universitari de Lingüística Aplicada-Universidad Pompeu Fabra.

"Analfabetismo funcional" (2014). *Wikipedia. La enciclopedia libre.* Last modified: October 23, 2014. http://es.wikipedia.org/w/index.php?title=Analfabetismo_funcional&oldid=77706574

Anguiano Peña, Gilberto (2006), *Modelo sociolingüístico del léxico del español usado en México.* México: El Colegio de México, Centro de Estudios Lingüísticos y Literarios, *Diccionario del español de México.* [Unpublished paper]

—— (2013a), *El léxico común del español de México.* México: El Colegio de México, Centro de Estudios Lingüísticos y Literarios, *Diccionario del español de México.* [Unpublished paper]

—— (2013b), *Palabras vacías del español de México.* México: El Colegio de México, Centro de Estudios Lingüísticos y Literarios, *Diccionario del español de México.* [Unpublished paper]

Barcala Rodríguez, Francisco Mario (2010), "Corpus lingüísticos estruturados de grandes dimensións: Metodoloxía e sistemas de recuperación de información." PhD diss., Universidade da Coruña, Departamento de Computación. http://ruc.udc.es/dspace/bitstream/2183/7171/1/tese_mario_barcala.pdf

Blázquez Ochando, Manuel (2013), *Técnicas avanzadas de recuperación de información: procesos, técnicas y métodos.* Madrid: Universidad Complutense de Madrid. http://mblazquez.es/wp-content/uploads/ebook-mbo-tecnicas-avanzadas-recuperacion-informacion1.pdf

Bogomilova Lozanova, Elena, (2009), "Posibilidades y límites del análisis cuantitativo de corpus especializados." In *Memoria del I Simposio Internacional sobre Organización del Conocimiento: Bibliotecología y Terminología,* compiled by Catalina Naumis Peña, 63-78. México: UNAM, CUIB.

Cabré, María Teresa (1999a), "La terminología hoy: concepciones, tendencias y aplicaciones." In *La terminología: representación y comunicación: elementos para una teoría de base comunicativa y otros artículos,* 17-37. Barcelona: Universitat Pompeu Fabra, Institut Universitari de Lingüística Aplicada.

—— (1999b), "La terminología y documentación." In *La terminología: representación y comunicación: elementos para una teoría de base comunicativa y otros artículos,* 231-247. Barcelona: Universitat Pompeu Fabra, Institut Universitari de Lingüística Aplicada.

—— (2002), "Textos especializados y unidades de conocimiento: metodología y tipologización." In *Texto, terminología y traducción*, edited by Joaquín García Palacios and M. Teresa Fuentes, 15-36. Salamanca: Ediciones Almar. http://www.upf.edu/pdi/dtf/teresa.cabre/docums/ca02te.pdf

Cabré, María Teresa, and Estopà, Rosa (2002), "El conocimiento especializado y sus unidades de representación: diversidad cognitiva." *Sendébar* 13:141-153.

Cardero García, Ana María (1996), "La integración del corpus de la terminología de control de satélites en México." In *Actas del V Simposio Iberoamericano de Terminología*, 106-111. México: UNAM.

—— (1998), "Algunas observaciones de los conceptos, sus áreas temáticas. La sinonimia y la polisemia en tres vocabularios especializados en México." In *Actas del VI Simposio Iberoamericano de Terminología*, 137-154. La Habana.

Cardero García, Ana María (2003), "Unidad y variedad del español de América. Los vocabularios especializados." In *Estudios de lingüística y filología hispánicas en honor de José G. Moreno de Alba,* compiled by Ignacio Guzmán Betancourt and María del Pilar Máynez Vidal, 299-322. México: UNAM.

—— (2004), *Lingüística y terminología*. México: UNAM, Facultad de Estudios Superiores Acatlán.

—— (2005), "Algunas características lingüísticas de las denominaciones de una terminología." *Lingüística Mexicana* 2 (1): 141-152.

—— (2009), "El descriptor y el término. Los conceptos y la lingüística." In *Memoria del I Simposio Internacional sobre Organización del Conocimiento*: *Bibliotecología y Terminología*, compiled by Catalina Naumis Peña, 53-62. México: UNAM, CUIB.

CEMC (*Corpus del Español Mexicano Contemporáneo, 1921-1974*) (1975), María Isabel García Hidalgo, Luis Fernando Lara, Roberto Ham Chande *et al.* México: *Diccionario del español de México.* [Unpublished paper]

—— (*Corpus del Español Mexicano Contemporáneo, 1921-1974. Lematizado)* (2005), by Gilberto Anguiano Peña, Francisco Segovia and Erika Flores García. México: El Colegio de México; UNAM, Instituto de Ingeniería. www.corpus.UNAM.mx/cemc/

Cunha, Iria de (2014), "Análisis discursivo, textos especializados y traducción." In *Manual de traducción de textos especializados. Nuevos enfoques, nuevas metodologías*, edited by Marisela Colín, 32-45. México: UNAM.

DEEM (Diccionario estadístico del español de México. Lematizado) (2005), edited by Gilberto Anguiano Peña, Francisco Segovia and Erika Flores. México: El Colegio de México, Centro de Estudios Lingüísticos y Literarios, *Diccionario del español de México.* [Unpublished paper]

DEM (Diccionario del español de México) (2012). México: El Colegio de México, Centro de Estudios Lingüísticos y Literarios. http://dem.colmex.mx/moduls/Default.aspx?id=8

DMLE (Diccionario Manual de la Lengua Española Vox) (2007). Larousse Editorial. http://es.thefreedictionary.com/tecnicismo

DTCE (*Diccionario de términos clave de ELE)* (2014). España: Biblioteca Virtual Cervantes. http://cvc.cervantes.es/ensenanza/biblioteca_ele/diccio_ele/diccionario/sociolinguistica.htm

DRAE (Diccionario de la lengua española) (2001). 22nd edition. España: Real Academia Española; Espasa Calpe.

Estopà, Rosa (1998), "El léxico especializado en los diccionarios de lengua general: las marcas temáticas." *Revista Española de Lingüística* 28 (2): 359-387.

Faber Benítez, P.; Moreno Ortiz, A., and Pérez Hernández, C. (1998), *Lexicografía Computacional y Lexicografía de Corpus*. http://www.ontoterm.com

Gómez González-Jover, Adelina (2005), "Terminografía, lenguajes profesionales y mediación interlingüística. Aplicación metodológica al léxico especializado del sector industrial del calzado y de las industrias afines." PhD diss., España: Universidad de Alicante, Facultad de Filosofía y Letras, Departamento de Filología Inglesa. http://rua.ua.es/dspace/bitstream/10045/760/1/tesis_doltoral_adelina_gomez.pdf

Halliday, M. A. K. (1979), *El lenguaje como semiótica social*. México: FCE.

Jiménez del Castillo, Juan (2005), "Redefinición del analfabetismo: El analfabetismo funcional." *Revista Educación* 338: 273-294. http://www.revistaeducacion.mec.es/re338/re338_17.pdf

Lázaro Hernández, Jorge Adrián (2010), "Extracción de la terminología básica de las sexualidades en México a partir de un corpus lingüístico." Thesis. México: UNAM. [Unpublished paper]

Lara, Luis Fernando (1977), "Una base semántica para la lexicografía: la conceptualización del signo lingüístico." *Nueva Revista de Filología Hispánica* 26 (2): 261-275.

—— (1984), "Una caracterización lingüística del discurso científico mexicano." *Discurso: Cuadernos de Teoría y Análisis* 2: 33-42.

—— (1996), "Conocimiento y pragmática en los fundamentos de la semántica." *Estudios de Lingüística Aplicada* 23-24: 236-243.

—— (1999), "Término y cultura: hacia una teoría del signo especializado." In *Terminología y modelos culturales*, edited by en María Teresa Cabré, 39-60. Barcelona: Institut Universitari de Lingüística Aplicada-Universitat Pompeu Fabra.

—— (2001), *Ensayos de teoría semántica: lengua natural y lenguajes científicos.* México: El Colegio de México.

—— (2007), *Resultados numéricos del vocabulario fundamental del español de México.* México: El Colegio de México. http://dem.colmex.mx/moduls/Default.aspx?id=14

Lara, Luis Fernando, and Ham Chande, Roberto (1979), "Base estadística del Diccionario del Español de México." In *Investigaciones lingüísticas en lexicografía*, Luis Fernando Lara, Roberto Ham Chande and María Isabel García Hidalgo, 7-39. México: El Colegio de México.

Lara, Luis Fernando, and Zahn, Jetta (1973), "El tecnicismo en el léxico del español mexicano. Posiciones posibles del DEM." In *Monografías generales del DEM.* México: El Diccionario del Español de México.

López-Barajas, Emilio (2009), "Alfabetización virtual y gestión del conocimiento." *Revista Electrónica Teoría de la Educación. Educación y Cultura en la Sociedad de la Información* 10 (2). http://www.usal.es/teoriaeducacion

López Morales, Humberto (2013), "¿Qué es la disponibilidad léxica?" *DispoLex: investigación léxica*. http://www.dispolex.com/info/la-disponibilidad-lexica

Marinkovich, Juana (2008), "Palabra y término: ¿Diferenciación o complementación?" *Revista Signos* 41 (67). http://www.scielo.cl/scielo.php?pid=S0718-09342008000200002&script=sci_arttext

Medina Urrea, Alfonso, and Méndez Cruz, Carlos (2006), "Arquitectura del corpus histórico del español de México (CHEM)." In *Avances en la ciencia de la computación,* edited by A. Hernández and José Luis Zechinelli Martini, 248-253. México: Sociedad Mexicana de Ciencias de la Computación.

Moreno, María José (2011), *El lenguaje secreto de la ciencia.* http://ababol.laverdad.es/ciencia-y-salud/2985-el-lenguaje-secreto-de-la-ciencia

Naumis Peña, Catalina (1997), "Reconocimiento semi-automático de patrones temáticos y adaptación del lenguaje documental para mejorar la eficiencia en la recuperación del sistema INFOBILA." In *Primer Congreso Interno de la Comunidad Científica del CUIB: los investigadores y sus investigaciones,* 23-27. México: UNAM, CUIB.

—— (1999), *Tesauro latinoamericano en ciencia bibliotecológica y de la información. TELACIBIN.* México: UNAM, CUIB.

—— (2000), "Análisis de la confluencia entre término y descriptor en la elaboración de tesauros." In *Investigación Bibliotecológica: Archivonomía, Bibliotecología e Información* 14 (29): 95-113.

—— (2003), "Indización y clasificación: un problema conceptual y terminológico [Indexation and classification: a conceptual and terminologic problema]." *Documentación de las ciencias de la información* 26: 23-40. http://www.ucm.es/BUCM/revistas/inf/02104210/articulos/DCIN0303110023A.PDF

Rey-Debove, Josette (1971), *Étude linguistique et sémiotique des dictionnaires français contemporains.* París: Mouton the Hague.

Rubio Liniers, María Cruz (2004), "El análisis documental: indización y resumen en bases de datos especializadas." In *E-LIS: E-prints in Library and Information Science.* http://www.iberius.org/es/AisManager?Action=ViewDoc&Location=getdocs:///DocMapCSDOCS.dPortal/2519

Sager, Juan C. (1993), *Curso práctico sobre el procesamiento de la terminología.* Madrid: Fundación Germán Sánchez Ruipérez, Ediciones Pirámide.

Sánchez González, Aránzazu (2010), *El proceso de comunicación*. http://zazu897.blogspot.com/2010/10/el-proceso-de-comunicacion.html

Temmerman, Rita (2000), *Towards New Ways of Terminology Description: The Sociocognitive Approach.* Amsterdam, Philadelphia: John Benjamins.

Van Dijk, Teun A. (1992), *La ciencia del texto: un enfoque interdisciplinario.* 3rd edition. Barcelona: Paidós.

Wüster, Eugen (2003) [1998], *Introducción a la teoría general de la terminología y a la lexicografía terminológica,* edited by María Teresa Cabré. Barcelona: Universitat Pompeu Fabra, Institut Universitari de Lingüística Aplicada.

Zipf, George Kingsley (1949), *Human behavior and the principle of least effort.* Oxford: Addison-Wesley Press.

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Information literacy typification and its contribution to learning of information users: A higher education experience*

Jorge Winston Barbosa Chacón **
Gloria Patricia Marciales Vivas ***
Harold Castañeda Peña ****

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Abstract

This paper presents results of research aimed at supporting information user learning in an undergraduate psychology program of a Colombian university, where the following methodological steps were followed: 1) From the perspective of a semiotic framework, infor-

* This paper reports the results of the Learning and Information Society research group, comprised of professors from the Pontificia Universidad Javeriana (PUJ), the Universidad Industrial de Santander (UIS) and the Universidad Distrital Francisco José de Caldas. Associated projects: PRE00439014390, PS4663-Vicerrectoría Académica PUJ; CH20092, CH 2012-2-Vicerrectoría de Investigación y Extensión UIS. We acknowledge the contributions of Professors Luis Bernardo Peña and Gustavo La Rotta Amaya, who are agents in the development of the Inquiry Project (PRIN) of PUJ.

** Universidad Industrial de Santander-Bucaramanga, Colombia. jowins@uis.edu.co
*** Pontificia Universidad Javeriana-Bogotá, Colombia. gloria.marciales@javeriana.edu.co
**** Universidad Distrital Francisco José de Caldas-Bogotá, Colombia. hacastanedap@distrital.uis.edu.co

mation-literacy competencies were reconceived, and after a period of observation, re-typified. 2) Research on information-literacy competencies was contrasted with challenges, needs and problems in the context of undergraduate education. 3) A proposal is forwarded that addresses information literacy, research and academic-writing competencies needed by first-year undergrads. Results show the importance of coordinating roles and processes that are mindful of specific educational contexts and disciplines. These factors are especially significant in promoting information user learning and the wealth of synergies that arise from the attainment of competencies of diverse orders.

Keywords: Higher Education; Social Science Research; Information Literacy; Competencies Development; Semiotics.

Resumen

Caracterización de la competencia informacional y su aporte al aprendizaje de usuarios de información: una experiencia en la formación profesional en psicología
Jorge Winston Barbosa-Chacón, Gloria Patricia Marciales Vivas y *Harold Castañeda-Peña*

Se presentan los resultados de una investigación cuyo objetivo principal es el apoyo al aprendizaje de usuarios de información en educación profesional universitaria. La estrategia metodológica, que tiene como contexto un programa profesional de psicología en una universidad colombiana, se estructuró y desarrolló en tres fases consecutivas: i) reconceptualización, observación y caracterización de competencias informacionales desde la perspectiva semiótica del discurso; ii) confrontación con retos, necesidades y problemas que plantea la investigación a la educación profesional universitaria y iii) propuesta de apoyo a la formación de estudiantes de primer semestre desde el marco del desarrollo de competencias investigativas, informacionales y lecto-escriturales. Se concluye denotando la importancia y los logros obtenidos cuando se armonizan los diferentes roles y procesos que apoyan el aprendizaje de los usuarios de información, en particular cuando se tienen en cuenta las dimensiones contextua-

les, disciplinares y educativas y, en especial, la sinergia ante el desarrollo de competencias de diferente orden.

Palabras clave: Educación Superior; Investigación en Ciencias Sociales; Alfabetización Informacional; Desarrollo de Competencias; Semiótica.

Introduction

The nature of Informational Competency (IC) is quite complex because of the many meanings such a concept can convey in addition to the many associated variables and the scant conceptual support that, such as they are, are not measurement-based definitions. Moreover, epistemological and theoretical efforts to understand information users are rooted in historical and cultural assumptions informing the nature of the person-to-information relationship; and these constructs consequently tend to diverge rather than converge on any one definition of Informational Competency (Marciales Vivas *et al*., 2010).

This complexity is largely responsible for the scant availability of measures of the nature of IC. A description of the features comprising IC, with a comprehensive and coherent articulation of associated variables, would constitute a valuable contribution to this field of problems (Marciales Vivas *et al*., 2010). An examination of the results of research on IC with regard to university education provides a useful starting point for drawing out a definition of IC. This research centers on an intervention performed in the Psychology program of the Pontificia Universidad Javeriana (PUJ)[1] carried out by the Learning and Information Society research group,[2] which performed an IC description study with first year students. This study also provided material for an educational proposal favoring the development of research reading and writing competencies, which in view of its scope is a shared duty of information science professionals, professors and faculty.

1 See information in PUJ at: http://puj-portal.javeriana.edu.co/portal/page/portal/PORTAL_VERSION_2009_2010/es_inicio

2 See participants and research experience of the group in the following link: http://201.234.78.173:8080/gruplac/jsp/visualiza/visualizagr.jsp?nro=00000000001836

Correspondingly, this paper documents the several phase of the research experience in six sections, each of which addresses one of the following matters: 1) The intervention context and the research design; 2) The reconceptualization experience; 3) Description of the typification experience; 4) The challenges posed by the research with regard to the training of student information users; 5) Support for information users, and 6) Final discussion and reflection.

Intervention Context and Research Design: The academic program and the aims of the research project

Psychology is a lecture-based undergraduate program ascribed in the Faculty of Psychology of PUJ. The program is targeted to students interested in: i) understanding the purview of Psychology; ii) understanding and assuming commitment to resolve the country's social problems; iii) acquiring social competencies in order to establish relationships and work in teams; iv) assuming responsibility and taking on academic commitments; v) development of reflective capacity and flexibility needed to deal with personal life situations.[3]

The Psychology curriculum is structured on the basis of two conceptual elements: 1) the fields of training and 2) the areas of problems with their respective transversal dimensions. Regarding fields of training, the formative proposal exploits this perspective to refer to and understand the discipline and profession as a structured space of knowledge and disciplinary development. *Table 1* describes the four fields of training included in the programs.

Table 1. Training fields in the Psychology program of PUJ

	Description	
Training fields	Foundations of Psychology	The reflections and knowledge that have allowed the development of Psychology as a discipline and profession constitute the focus of work. This field addresses questions regarding the makeup of the object of study, the articulation of developmental theories, the relationship between the person and society and Psychology's place in the field of science.
	Specific knowledge	This area addresses social fields of action and research, in which Psychology has developed relevant knowledge. Training seeks to define the relationships between knowledge and social problems. The four traditional fields of Psychology (clinical, educational, organizational and social) are complemented by juridical psychology and neuropsychology, while stressing the influence of psychology in society and culture.

3 Expanded details of the program at: http://puj-portal.javeriana.edu.co/portal/page/portal/Facultad%20de%20Psicologia/INICIO

	Training in methodology and research	This area explores epistemological, theoretical, conceptual, logical and technical-instrumental foundations of Psychology, allowing the student to grasp and implement the pertinent methods and procedures for both psychological treatment and research.
	Multidisciplinary training	This line of inquiry articulates a broad subset of theological and ethical considerations, while offering complementary elective course options.

Source: Drawn from the program website.[4]

The educational agents understand the inquiry areas are guiding enunciations of the problems that are relevant to psychology, around which questions can be posed and debate structured. These guiding axes also serve to orient research production and undergraduate education standards. As such, these inquiry areas are divided into four salient aspects: the historical, epistemological, methodological and theoretical.

As demonstrated by the profile of the graduate and the conceptual elements of the educational proposal, this should be strengthened in accord with the tendencies and demands of the specific field of training. This challenge must be understood and faced from the standpoint of research and intervention integrating the diverse educational agents who participate in the delivery of the program. One intuits that the conceptual elements of the program and the educational components demand educational challenges that go beyond the discipline, and in this regard development of IC is key. This commitment requires a typification and/or definition of informational competencies, as well as a visualization of educational proposals favoring the development of transversal competencies.

As influential agents in the programs, the members of the research group drafted a research project whose objective is to provide answers to questions about the typification of students as information users and thereby support the creation and execution of formative proposals. To this end, in terms of methodology, the research proposal was structured in four specific experiential phases:

- *Phase I: Referential framework.* This consists of the experience aimed at determining the conceptual and theoretical support for the IC definition study.

4 See: http://puj-portal.javeriana.edu.co/portal/page/portal/Facultad%20de%20Psicologia/plt_psicologia/Plan%20estudios

- *Phase II: Characterization.* The experience of construction of an instrument for observing IC and its respective typification process. This phase was comprised of two specific research designs, which shall be described farther on.
- *Phase III: Complementation.* The experience of determining the relevant challenges, needs and problems issuing from research associated with the object and context of the study.
- *Phase IV: Intervention proposal.* The experience of applying the research results.

The reconceptualization experience: The starting point for typifying informational competencies

Published theory and research on IC stress the traditional ideas of the Association of College and Research Libraries (ACRL, 2000) and the American Library Association (ALA, 1989), which understands IC as one's ability to know when information is required, combined with the skills to locate it, understand its organization, assess its value, learn from it and put it to use effectively (Marciales Vivas *et al.*, 2010; Barbosa-Chacón *et al.*, 2010).

These works focus on the acquisition, development and demonstration of individual abilities; and the identification of information search, assessment and use practices (Marciales Vivas *et al.*, 2010). There is quite a bit of discrepancy between these traditional conceptions and the reconceptualization proposed herein, which underpins the typification of IC profiles.

The proposed reconceptualization begins by affording value to the history of the concept of information science, which is comprised of three foundational vectors: i) the preference for measuring knowledge through objective tests; ii) the focus on information processing, and iii) the interest in accounting for the cultural context of the users. This progression occurred largely under the influence of Vygotsky in the decade of the 1990s (Montiel-Overall, 2007).

The reconceptualization proposed rightly belongs to the last stage in this progression, whose salient features are shown in *Table 2.*

Table 2. Sociocultural Perspective of IC

Relevant aspects of the sociocultural perspective of IC		
Variables	• Culture is inseparable from the way people think and learn. • Human activity is situated in a context of social and cultural interaction. • The interaction with others as mediator of the construction of knowledge. • Cultural and contextual differences as the foundation for configuring ideas and practices.	
Pillars	• The incidence of sociocultural factors in the evolution of competencies. • The mediation of the culture in the way a person constructs meaning on the basis of information and his manner of acting. • The flexibility and dynamic nature of IC.	
Features	• The authority of individuals and communities is acknowledged when information is created, assessed and used, not only the authority of sources validated by the scientific community. • It is understood that all information contains bias. As such, informational competency includes the capacity to identify bias. • Information does not exist as an objective reality, but rather is constructed by individuals within a continually changing socio-cultural context and it is transformed by reality. It is an instrument for creating knowledge influenced by cultural factors that are interrelated through the way information is created in communities, how it is transmitted and the contexts in which it is used.	
	IC as practice with social and cultural dimensions	Presupposes the existence of a nexus between its development and training of a social person who is capable of critically and ethically assuming the many cultural factors mediating access to information.
	Historical dimension of IC ž	• The information user is a dynamic, changing entity. • The history of the person is comprised of memory and forgetfulness, and establishes continuities and discontinuities associated with the way information is accessed, assessed, appropriated and used. • Instruments and practices emerging from user interactions in their respective communities are relevant, because they affect beliefs and practices. • Interactions are configured as instruments for building meaning and they are expressed in the habitual forms of relating to information in specific contexts. • The appropriation of information in specific cultural contexts is fundamental to the development of competencies and social capital.

Source: Adapted from Marciales Vivas *et al.* (2010: 646-648) and Barbosa-Chacón *et al.* (2010, 2012: 128-131)

On the basis of these ideas, we propose a definition of IC that diverges somewhat from the traditional definition while not altogether abandoning it:

> Information competency is the web of adhesions, beliefs and relationships existing between motivation and aptitudes of the knowledge seeking person, built up over a long history of formal and informal learning contexts. This web of relationships acts as a referential matrix of the manners of appropriation of information,

> which occurs as a result of accessing, assessing and using information and express the cultural contexts in which they were constructed. (Barbosa-Chacón *et al*., 2010: 137. Translated from Spanish)

Defined in this way, IC becomes a construct in which interrelated conditions and assumptions articulate the four modalities of Potentiating, Virtualizing, Actualizing and Fulfillment (Greimas, 1989; Serrano Orejuela, 2003; Alvarado, 2007; Rosales, 2008). According to Greimas: i) the competence is configured as the being of doing, a potential state in which the act is a hypotactic structure that fuses competence and performance, and ii) the know-how corresponds only to one of the modalities constituted by the competence, understood as know-how that precedes performance. Consequently, the competence consists of the pre-existing conditions that make performance possible. Performance is in itself nothing other than the form the action takes and should not be conflated with the competence properly speaking (Alvarado, 2007).

With regard to the information supplied, the actions of person using an information source are mediated by diverse conditions he or she brings to the fore, including know-how (cognitive competence); ability (capacity); desire (will); and duty (prescription). This means when the person is modalized by his beliefs, he has assumed the determinants of both his culture and social group (Alvarado, 2007).

The levels or modes of existence are shown in *Table 3*, which also includes data form the case study[5] (See development criteria in *Table 4*). These levels or modes of existence account for the elements that comprise and articulate the reconceptualization of IC, while also framing the typification of the information user profile. A broad examination of theoretical and procedural aspects supporting the reconceptualization performed can be found in Marciales Vivas *et al.* (2008) and Barbosa-Chacón *et al.* (2010, 2011).

5 This paper examines the reconceptualization of IC through a case study. Further detail of this case are provided in Barbosa-Chacón *et al.* (2010).

Table 3. Modes of existence of the competency

Competency			Performance
Modalities			
Potentiated mode	Virtualized mode	Actualized mode	Fulfilled mode
Beliefs	Motivations	Aptitudes	Effectuations
Belief, Adherence (Assumed or imposed cultural determinants)	Desire (Will) / Duty (Prescriptions)	Know-how (Knowledge) / Ability (Capacity)	To be - to do
These are the views of the world held that are manifested when the person defends a position before a problem, need or topic posing a challenge.	Comprised of the wishes and duties; that which moves the person to take action.	Corresponds to the knowledge of what and how to carry out an action. For students, this presupposes knowledge of the context of the "task or job" and of the factors entailed in achieving solutions.	This is the performance using the information sources. It is expressed in the way in which the job is appropriated and its performance communicated.
Illustration (deduced from the case study. Translated from Spanish)			
• "The internet offers me the advantage of getting information rapidly." • "[…] it has inculcated in me the need to use serious, respectable sources and not listen just any comment."(EMS)[6]	• "[…] like everything related to the world wars are things I've always been interested in […]". • "First, the information is very broad, so I have to verify whether the information I'm getting is right and reliable, to put is some way." (EMS)	• "You just use the search engine and download the file containing the information and you read it." • "I entered Google and I gave it specific dates, Names, videos and other words […]." (EMS)	

Source: Based on Alvarado (2007: 5-9) and adapted from Barbosa-Chacón *et al.* (2010: 132-136)

The Typification Experience: The foundation for deducing informational competency profiles

With the result of the reconceptualization of IC, the construction of an instrument for IC pre-typification observation was undertaken in accord with specific research designs that are described in *Table 4.* Broader theoretical and procedural support for these studies can be reviewed in Castañeda-Peña *et al.* (2010), Barbosa-Chacón *et al.* (2012) and González Niño *et al.* (2013).

6 (EMS) This represents the anonymous identity of the participating student in the case study.

Table 4. Research design for typification of informational competency

IC observation instrument		
Research question		What kind of observation instrument is needed to describe the IC of university students?
General objective		To build an observation strategy to describe the IC of university students.
Working thesis		The appropriation of cultural meanings that are part of the social relationship and empowerment of the subject and entailed in their IC.
Case studies		
Methodology		i) Set a task requiring frequent consultation of information resources: ii) Gather the student's report (individual behavior) that is the product of interaction with information sources (the observed phenomenon); iii) Address the phenomenon within the real educational context: vi) Determine the what, how and why of the phenomenon; v) Visualize evidence that supports or refutes the semiotic perspective of the discourse; vi) Record observations of the phenomenon, and vi) Design and apply a case study protocol.
Instruments		*Observation cards:* i) Before: Include an instrument to gather sociodemographic features. Students provide written report of a successful experience using information sources: ii) During: Develop a test on the task that involves frequent consultation of information sources; iii) After: Perform and record semi-structured interview.
Analysis		Triangulation of the information gathered at each moment.
Typification of IC		
Population sample		60 university students enrolled in 2009 II in the PUJ Psychology Program.
Research question		What is the status of IC of new university students?
General objective		Description of IC of first semester students by observing their practices with information sources.
Working thesis		The appropriation of cultural meanings that are part of the social relationship and empowerment of the subject and entailed in their IC.
Type of study		Qualitative, observational descriptive study (pertinent to formal educational experiences when one wishes to describe the structure of a given phenomenon in order to answer a limited, systematic question).
Instrument		*Data collections component:* i) Questionnaire for determining initial profile; ii) Contract (agreement): A task requiring information searches and thinking aloud; iii) Story (manifestation of meaning), generated on the basis of the semi-structured interview. *Recording and analysis component:* Observation card in direct relation to the instruments for recording and interpreting the data.
Data recording and analysis		*Closed recording system and categorical descriptive:* This entails the selection and recording of the behavior patterns that evidence IC. Recordings and self-reports were used to record data.

Source: Based on Barbosa-Chacón *et al.* (2011: 8-14, 2012: 6-8)

In order to establish the information search task for this process, a review of similar experiences was performed which identified a task used by Hofer (2004) in the study of personal epistemologies. In the task proposed by Hofer, the criteria of Documentation and Validation and Potential Interest (Marciales Vivas *et al.*, 2010) are met.

The analysis process

The understanding of modalities of competency led to the identification of categories and subcategories for observation of IC. *Table 5* provides the defi-

nitions of each of these in accord with the diverse modalities (González Niño *et al*., 2013; Barbosa-Chacón *et al*., 2012).

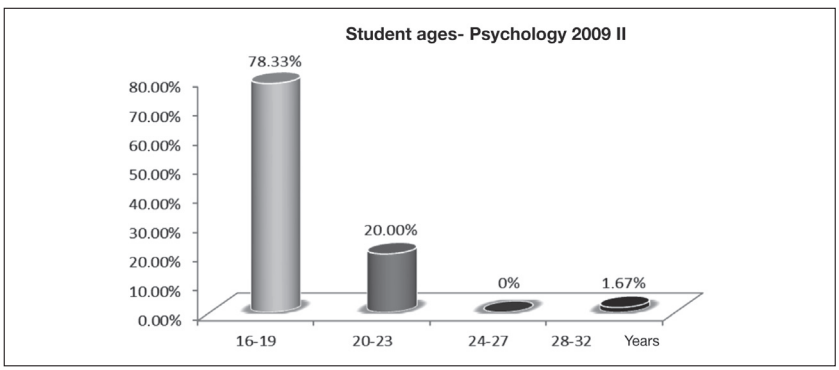
Table 5. Structural categories and sub-categories

		Category	Sub-category
Empowering	Beliefs and Adhesions	*Nature of the knowledge:* Beliefs about the knowledge, on a continuum from knowledge as an absolute to knowledge as relative, contextual and constructed.	Certainty of knowledge
			Simplicity of knowledge
		Process of knowing: Beliefs built about the process of knowing, including the assessment of evidence, the role of authority and the process of reasoning.	Justification of knowledge
Virtualizing	Motivations	Subset of reasons that move one to action that exist on a continuum ranging from duty to inherent motivations, such as self-determination, curiosity, challenge or effort.	
Actualizing	Aptitudes	*Knowing:* Knowledge about access, evaluation and use of information sources and their usefulness with regard to academic endeavors.	
		Ability: Personal or contextual resourcefulness possessed for performing a task.	
Realizing	Performances	Behaviors that evidence the forms of gaining access to, evaluating and using information observed during the performance of the task within a learning context.	

Source: Based on Barbosa-Chacón *et al.* (2012: 6-8) and González Niño *et al.* (2013: 116-118)

Sixty students of the Psychology Program participated in the study. The average age of the subject was 18.65 years and the age distribution is shown in *Chart 1*, which shows that a large majority (78.33%) were not yet 19 years-old.

Chart 1. Age distribution of Psychology students enrolled in 2009 II



Source: By author

The age distribution is important in terms of how it affects informational behavior, especially with regard to habitual or preferred practices of using information sources characteristic of an age group. In this regard, the term "practice" as used herein refers to doing something in a historical and cultural context providing it meaning, revealing the site-specific character of the competence in the history of the subject (Wenger, McDermott, and Snyder, 2002). The conceptual and methodological referents presented previously configure the framework of the definition of three IC profiles for students. These profiles shall be addressed later in this paper.

Informational competency profiles as products of typification

Each profile was delimited as a function of the competency profile, in the understanding that the profile is not a static construct. Thus, the potential beliefs, motivations and abilities for each profile, which manifest in the ways a person accesses, assesses and uses information, were identified. The following tables show the outstanding features of each profile, while accounting for situated learning experiences, and provide exerts from some of the student reports gathered during the study.

Table 6. Typification of the gatherer profile

Gatherer profile	
Experience situated in learning/Exemplification	
Opposition of information delivered by teacher and that gathered from other sources	"No, I really just go by what the photocopies say." (R-6:11-LR. Translated from Spanish)[7]
Orientation provided by family or others regarding the use of information sources	"At least my father reads quite a lot, but I don't have the habit and my brother and mother read only a little." (R-6:22-LR. Translated from Spanish)
Oral expositions	"At the end of the day, no one was going to ask me where I go the information or anything. I just had to say what the professor already knew. It didn't matter if it was what my dad told me or if I found it in a source. It wasn't so important. And in papers it wasn't important to cite sources."(R-4:11-SP. Translated from Spanish)
Academics tasks	"I limit myself to what is…to what the topic contains. The example I was giving is from finance. I can't make in big changes. I do what I have to do and that's the end of it." (R-5:25-BT. Translated from Spanish)

7 Excerpt code R-6:11-LR is read as follows: R indicates the source of the datum, in this case a student report; 6:11 indicates the report number and the number code of the part of the report; and LR is the anonymous identifier of the participating student.

Corresponding features
· Beliefs about the existence of truth in a given external source of information. · Internet is valued as a useful tool because: "everything can be found there." · Gathering a lot of information and possessing it are two important criteria. · There are few familial or scholastic guiding experiences regarding the use of information sources. · Learning about access, evaluation and use of information sources comes largely from trial and error. · Successful academic results receiving positive grades prevail over time. · The motivation for doing academic work entailing access, evaluation and use of sources is largely a function of duty or obligation.

Source: Adapted from Castañeda-Peña *et al.* (2010: 205) and Marciales Vivas *et al.* (2010: 14-17)

It is clear that both motivation and life experience involved in IC of the gatherer subject differ considerably in the verifier profile.

Table 7. Typification of the information verifier profile

Verifier profile	
Experience situated in learning/Exemplification	
Writing an essay requiring the evaluation of information sources	"We have to take information from distinct sources offering different points of view in order to write an argumentative essay (not expository), which may examine several points of view…it's a problem found for both is that at the end you draw conclusions from that." (R-3:13-MPR. Translated from Spanish)
The information source search limits with regard to usefulness of the source in terms of the relationship between accumulation-appreciation	"Even finding really good sources, because Google also has e-books. There are books that you can read online in Google. It's really good if you find these data bases, if you find articles about an author you are using and that's really good." (R-2:12-DR. Translated from Spanish)
Use of the Internet	"There are things you find obviously on internet and they are useful, but I thought it was better to have…as data from other books, of things that can help a little bit more." (R-6:9-LR. Translated from Spanish)
Motivations before beginning tasks	"First you do it with passion for research, as we say tomorrow I have to write a paper, what a drag! When I don't like it, but oh! I gotta do the Philosophy paper on Socrates. And it's what you really love and it's cool and you do it gladly, with love and that always shows through." (R-1:31-NJ. Translated from Spanish)
Corresponding features	
· The belief that knowledge is relative, contextual and obeys the perspective from which it is approached. · The search for information sources is performed largely through data bases, libraries and web texts on research, sources that are verified by putting them in juxtaposition with others. · The use of search engines, generally Google, obeys two motives: i) time limitation and ii) their usefulness in creating a general framework for the research topic. · The possibility of learning something new is a key motivation to use sources.	

Source: Adapted from Castañeda-Peña *et al.* (2010: 205) and Marciales Vivas *et al.* (2010: 17-19)

The protagonist role of the subject in the reflective profile, especially in the rationale provided for the informational behavior as related to learning, is particularly apparent.

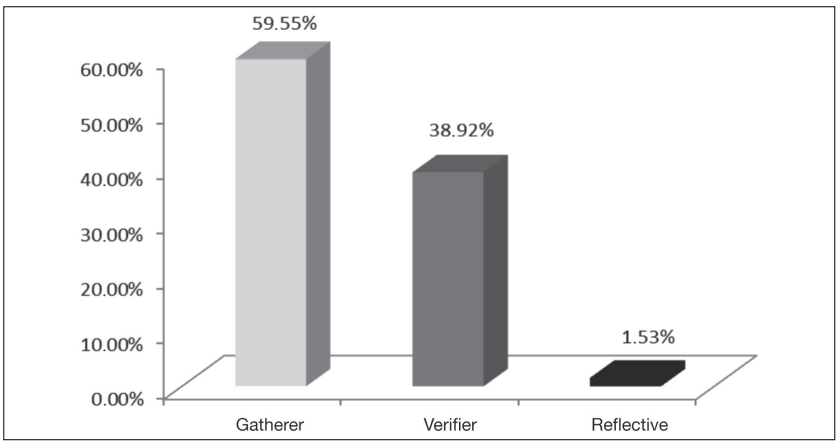
Table 8. Typification of the reflective profile

Reflective profile	
Experience situated in learning/Exemplification	
Organization of information search	"You begin with broad ideas, for example in this, in an inquiry project, one always begins with a broad notion, with ideas that are very board…like really dreamy, to put it somehow, like how cool it would be to learn about such things, but then that's where you begin to look to see it that's what you want to know, what information is there, what can be researched, what can we find and how we can work with that." (R-4:24-SP. Translated from Spanish)
Writing academic essays	"I go over and revise what I just wrote and begin to relate it, to understand what it was that I wanted to say when I wrote that idea, and then I really begin to write the essay, but unrelated, including just the idea I wrote, and assessing its coherence, that is, that other persons understand it as I understand it…Coherence of the ideas….and also including my point of view." (R-5:21-BT. Translated from Spanish)
Corresponding features	
• Tendency to formulate one's own questions before beginning search of information sources. • Planning before undertaking search. • The practices suggest the student assumes the role of active builders of information. Their educational activity is underpinned in both their interests and their ability to be critical of information sources regardless of their authority. • What is important, beyond the academic tasks themselves, is how these contribute to the life projects and the value to be found in new knowledge.	

Source: Adapted from Castañeda-Peña *et al.* (2010: 205) and Marciales Vivas *et al.* (2010: 20-22)

After determining the three profiles, it was found that the gatherer profile is the most representative of students entering the university, while the reflective profile is the scarcest. In fact, only one student was classified as a reflective type, which in accord with the description already given is the most important and valuable IC profile. The distribution of profiles is shown in *Chart 2*.

Chart 2. Distribution of IC profiles.



Source: by the author

In view of this reality, questions and educational commitments with regard to all fields of area of training arise, but especially with regard to information science. For this reason, we shall stress some challenges derived from the research and which constitute the foundation for proposing interventions in the university context.

Challenges posed by research regarding the training of university student information users. Commitments for qualifying new students

The contributions to and challenges posed by IC research are multidimensional. The development IC demands close collaboration among the diverse parties responsible for training processes. In this regard, one would do well to ask about the complementary functions that information science professionals must assume to support students in the information society, where informational competency has implications in the educational, economic, social and political spheres. These implications, according to Garmendia Bonilla (2005), are part of the informational culture needed to perform in today's world. Research also serves to reveal conflicts between the information society and the process of constructing knowledge. These points of friction include: i) the rootlessness of information, which will require revaluation of the concept of authorship, something seemingly irrelevant when it is so easy simply to note the date of consultation and the web page; ii) the relationship between text and hypertext, entailing actions of hierarchy and centrality, requiring the development of competencies for lateral reading (Fainholc, 2004; Eshet-Alkalai, 2004); the construction of informational source maps that show the relationships arising from the standpoint of reader-author, i.e., configured as a prosumer (Corona Rodríguez, 2012; Giurgiu and Barsan, 2008); iii); and information overload, which requires the development of pertinent management criteria for filtering information rigorously (Valverde Berrocoso and Garrido Arroyo 2005; Vonderwell, 2003). The challenges facing young information users should not be a problem if they are assumed to be digital natives in light of their evident abilities for learning and communication (Cabra-Torres and Marciales Vivas, 2009; Prensky, 2001); but the results of research have raised doubts because of the presence of the problems or necessities shown in *Table 9*.

Table 9. Problem and needs arising from research experience

		Needs/Problems
Experiences	Relationship with information approach	The typification of the sample IC shows that the Gatherer profile is the most common. This is the profile that requires the most educational support. In contrast, the Reflective profile is quite scarce. From the academic standpoint, this profile is the most desirable. The need for intentional, contextualized teaching of the abilities required to approach information sources effectively becomes apparent. (Castañeda *et al.*, 2010; Barbosa-Chacón *et al.* 2012).
	Relationship with research	There are some difficulties in understanding research tasks when the problem posed in the inquiry question is ambiguous or vague. This situation is exacerbated when is there too much information, leading to questions regarding how to choose the most important ideas. Students also may wonder how to select the most relevant information. (Alzate and Peña, 2010).
		Instrumental, research and strategic abilities evidence the developmental prevalence of the former over the latter two, which are not developed through experience, but rather as products of formal, purposeful actions. (Van Deursen and Van Dijk, 2008).
		The research competency deficits exhibited by students reveal the lack of a systematic approach to teaching research methodology. This problem is evident in the deficient expertise and skills of graduates. (Álvarez Villar, Orozco Hechavarria and Gutiérrez Sánchez, 2011).
		The development of the research mentality is not always aligned with the ability to read, interpret and write academic texts. (Alzate and Peña, 2010).
	Relationship with reading/writing process	Difficulties in understanding, summarizing and critically assessing texts have been reported. This comes in conjunction with problems with writing essays and argumentative papers. (González Moreno, 2012; Cardinale, 2007).
		There is evidence of low degrees of planning in the task of writing essays, and also in the task of reorganizing ideas and the integration of the text itself. (Ochoa Angrino and Aragón Espinosa, 2007).
		The abilities associated with the use of digital texts exhibit a tendency to generalize the abilities developed for printed text, even though they do not operate in the same way. (Almind and Ingwersen, 1997; Eveland and Dunwoody, 2001; Fitzgibbons, 2008).

Source: By author

In view of these problems and needs, university educational agents must commit to IC, research skills and reading-writing abilities. This goal will demand the design of formative proposals that guarantee significant levels of appropriation, empowerment and sustainability in students; i.e., new, proper teaching approaches at the outset of academic programs will be required. (Batellino and Lissera, 2006). In this sense and as an alternative way of achieving the aforementioned levels it is important that these training programs be underpinned by theoretical and procedural benchmarks, such as those shown in *Table 10*.

Table 10. Theoretical and procedural benchmarks underpinning training processes

		Description/Action horizon
Referent	Independent work	This approach encourages students to learn on their own, within an approach that guarantees motivation to do the work. This strategy helps students be less dependent on the teacher (Rodríguez Cobián, 2009; Broad, 2006; González Jiménez, 2010).
	Learn by doing	Based on the idea that the best learning occurs through practice in real situations, where students learn insofar as they are engaged in concerted effort, this approach encourages students to improve their practices and value what they learn (Raij, 2007; De la Orden, 2007; Marcos, 2011).
	Peer learning	This strategy allows students to recognize that supporting each other during the learning process is a good way to learn and develop more fully (Topping, 1996; Griffin and Griffin, 1998; Newman, Griffin, and Cole, 1998; Ferrer, 2003; Durán Gisbert and Huerta Córdoba, 2008; Alzate and Peña, 2010).
	Problem-based learning	The aim is to learn by solving problems associated with the discipline, while using reliable sources. This entails tutoring and accompaniment in order the ensure students are capable of applying knowledge to solve such problems (Bernhard, 2002; Dochy, Segers and Dierick, 2002; Serrano de Moreno and Peña González, 2003).
	Critical and reflective writing	Understood as a way of approaching complex cognitive processes as a conceptual appropriation mechanism and in terms of the practical doings of research (Marciales Vivas, 2003; González Moreno, 2012).
	Learning support materials	Materials providing content and non-linear activities that guide and challenge the student to learn. These materials shall be appropriate for the target population, the exigencies of the educational modality and the academic program (principles and profiles) (Gualdrón and Rey, 2002; Penzo *et al.*, 2010).
	Interdisciplinary and collaborative work	This implies cooperation among educational agents of the diverse instances and areas of professional formation, and implies the interrelatedness of learning processes, teaching, research, and the social and organizational contexts (Bernhard, 2002; Uribe Tirado, 2010; Marciales Vivas *et al.*, 2013).

Source: By author

Consequently, the next section examines a joint experience involving teachers and information science professionals, who base their initial evaluation of university students from the standpoint of the commitments associated with the information users' learning. This effort is also informed by theoretical and procedures benchmarks set in for design and development of the aforementioned training proposals. The proposal integrates professional training and contributions from Library Science, while taking into account features of the PUJ Psychology curriculum as the context of learning.

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The matters documented up to now evidence the stress that should be afforded to the intervention context, especially with regard to needs and problems of the target population. In accord with this idea and within the context of PUJ, the research identified specific elements of the incoming undergrad profile as a starting point for determining initial informational needs in order to plan support strategies and assess academic performance. The following table shows the problems reported by students in the first semester of 2009 II. These students participated in the typification experience described.

Table 11. Problems reported in the typification study

		Exemplification (Stories. Translated from Spanish)
Issues	Lack of clarity with regard to the construction of the essay	"In the university I have seen this change and it is a radical change from what I experienced in college, where they would assign homework and essays and even my teachers didn't know what an essay is and I didn't either…then I went to Wikipedia and copied and pasted. Maybe I learned a little but I didn't turn in what the teacher wanted." (NJ)
	Adhesion to exclusive information search scenarios	"No, since my college days it was all internet and that is why I'm sort of good at looking for things and with regard to specific points even more so, but I don't generally consult books." (NJ)
	Variability in the degree of depth and extension of academic essays	"Well, I used to go deeper, my papers were usually long and compared to my classmates, who were happy to cover just one aspect and be done with it. I usually would go a bit further." (NJ)
	The role of motivation in the production of academic work	"It might work longer on an essay I do not like than on one I do like, because when I don't like something I take longer and I procrastinate, because the reading is not to one's liking." (MP)
	Indecision with regard to information evaluation criteria. (inclusion and exclusion)	"But when I consult a source, everything seems important, then I have a hard time limiting the topic…" (BH)

Source: By author

Situations such as these motivate educational agents of the PUJ Psychology Department to initiate several approaches for developing Informational Competencies and the research, reading and writing skills of students. One of these approaches is the pedagogical experience called the Inquiry Project (PRIN by its Spanish-languaje acronym). Typification study subjects were trained in this approach.

The Inquiry Project

Educational agents of the Psychology Department understand that a solid appropriation of written language is a key factor for strengthening IC and another supply for financing the academic community. In addition to being fundamental for developing critical and reflective thinking, the processes of reading and writing are fundamental to learning, research and communication of ideas. In all of this, questioning plays a key role because it is the force that drives the search for knowledge (Peña, 2009).

This framework is included in the Inquiry Project, an initiative supporting incoming undergrads of the Faculty of Psychology since 2006. The purpose of this project is to inculcate students with the importance of posing questions and performing subsequent inquiry.

Through this project, the faculty expects to develop a positive attitude in students with regard to research, while creating a space for the articulation of diverse perspectives within the field of psychology. This approach promises to raise abilities to match the demands of written discourse in the field (Alzate and Peña, 2010; Marciales Vivas *et al.*, 2010).

These objectives are materialized through a strategy that brings together several elements: i) the accompaniment of a professor; ii) pair and group work based on cooperative learning; iii) guidelines for classwork with orientation in academic genres, such as summaries, reviews and essays; and iv) synchronization of support resources (workshops and tutoring).

The didactic and pedagogical approach stands besides ongoing assessment, thanks to the participation and participation of three main educational agents: i) the professor, who acts as an "expert" and whose function is to set the general guidelines of the work; ii) the tutor, a student already trained in the project who works with the professors and serves as a link between the professor and students; and iii) the group of students, who are involved in ongoing exchange and assessment of classroom work.

The development of the Inquiry Project unfolds through the IC workshop. The following are the phases and several reflections and assessments regarding its practice.

Phases of the Inquiry Project

Table 12 provides a summary of the activities performed in each of the project phases and the description of the product to be assessed.

Table 12. Phases of the Inquiry Project

Inquiry Project	
Phase	Teaching, learning and evaluation experiences
Topic, problem and inquiry questions	• Each professor holds an individual tutorial with students in order to frame the topic and inquiry problem. • Teacher and tutor suggest sources of information in order to broaden the student's understanding of the problem and help reformulate the inquiry question. • Students review basic bibliography and identify power ideas and the most significant ideas for articulating a question with regard to the psychological issues. • Teachers provide tutoring in order to assess, review and contribute to the selection of the topic/problem and the articulation of the inquiry question.
	Product of the phase: An exploratory essay that supports the selection of the inquiry problem.
Documental Investigation	• Students review recommended bibliography and search for other sources. • The sources and information found are summarized on index cards. • Tutor aids students to search for bibliography and the analysis and interpretation of texts consulted. They also provide support in the summary drafting process. • An IC workshop is held within the context of this phase.
	Product of the phase: Documentation of summaries for creating the framework of the final essay
Essay rehearsal	On the basis of the workshop and the orientation provided by the teachers and tutors, the students develop the essay and write the first draft.
	Product of the phase: Essay map and first draft.
Drafting essay	• The teacher reviews the plan and the draft essay and performs a tutorial in which the thesis, the relevance of arguments and its bearing on psychological theory are discussed. • The student revises the essay on the basis of these observations and clarifies the thesis and strengthens arguments. • The tutor aids the student to revise the essay. The teacher evaluates the final essay on the basis of the criteria previously constructed and known to the student.
	Product of the phase: Academic essay.
Socialization	• The essays are read in group tutoring sessions in order to share and enrich the discussions within the subject area. • One essay from each group is selected to be presented in the colloquy held at the end of each academic period. Teachers and first year students attend this presentation.
	Product of the phase: Interaction.

Source: Adapted from Marciales Vivas *et al.* (2010: 23-31) and Alzate and Peña (2010: 127-136)

Informational Competency Workshop (ICW)

The drafting of texts using documental sources is a common task of university students. According to Spivey and King (1989) and Vásquez (2008), this

task is called "discursive synthesis," and it entails rephrasing the original material so that is becomes a new text. As can be seen in *Table 12*, the Inquiry Project includes training in text drafting in its first two phases. To make these drafts, students must perform bibliographical research, condense information considerably, organize it in a new way, establish intertextual relationships, compare positions and, finally, synthesize findings in a coherent text (Alzate and Peña, 2010; Marciales Vivas *et al.*, 2010).

As stated before, the problems inherent to writing texts often hide deficiencies in reading, understood as a social construction in which the text, reader, institution, times and places, and practice and persons play their roles. This outlook justifies the presence of ICW, which is designed to achieve two ends: on one hand it supports the development of reading and informational competencies, so students can more fully exploit the library resources at their disposal; and on the other, it serves to motivate students to read and inculcate the spirit of research and independent learning. In essence, ICW is a strategy inherent to the research process and the PUJ information user training service. The development of ICW requires teams that understand the contexts and needs of the specific projects (topics and inquiry problems) to be performed by students. This understanding provides the material for the workshop, in terms of activities and practical exercise. This allows the ICW to be meaningful and motivating. The central focus of the activities is the search for and selection of information, which entails identifying the proper mechanisms for accessing, assessing and using it critically. The concrete product of this activity is to produce a bibliography whose currency and relevance can be discussed with professors and tutors. The aim of the ICW is to position the library as an information bank, and place of study and research. (Alzate and Peña, 2010; Marciales Vivas *et al.*, 2010).

Observation of the Inquiry Project experience

- Regarding contents: i) early on the topics were set by the students in accord with their interests. Later on the so-called "fields of inquiry," were established by the first-semester faculty, consisting of a menu of topics reflecting the content of their coursework; ii) to support this work, a content resource management website was launched. This website offers the opportunity to access and learn more about the project, while allowing monitoring of student work over the course of the semester. Similarly, a project Facebook page is currently being used because of popularity of social media with students.

- Regarding interaction. The way in which the relational moments between educational agents have been organized has allowed the promotion of stronger personal and interpersonal abilities (reasoning, staking out positions, collaboration), thereby encouraging traditional and instrumental limits associated with learning to be transcended.
- Regarding impact on students. Several changes were observed in the attitudes and statements of Psychology students regarding the educational experience, especially with regard to their approach to information. In this respect students: i) have begun to make better use of information, which is evident in the quantity, quality, relevance and variety of sources they consult, including the broader use of specialized journals and books; ii) have gained greater autonomy and often seen returning to the library of their own accord to carry out further research; iii) have begun to differentiate the features of academic writing and incorporate these features into their writing; iv) have reported that the Inquiry Project has allowed them to have a greater understanding of the value of information as a research resource, the responsibilities assumed when citing sources and the power it gives them to question beliefs they hold as true.

Other reflections and observations can be consulted in Alzate and Peña (2010) and Marciales Vivas *et al.* (2010).

Final reflection and discussion

Informational Competencies as a subset of beliefs, motivations and abilities built over the lifetime of a person must be understood and developed in learning contexts that provided comprehensive, variegated approaches that take into account family, schooling and other social, cultural and economic factors.

The typification provided herein establishes IC profiles, while also highlighting the needs and problems of students faced with academic challenges at the university level. As such, the profiles are posited as pre-texts for educational agents to reflect on the actions to be taken and in order to ensure that access to higher education is a genuine route to personal and social development, and that it does not become a frustration factor.

In view of the interest of educational institutions and governmental agencies in ensuring educational equality at the university level, several question

are posed regarding how to make equality a condition of the educational process and not only a quantitative admissions factor. To this end, we must seek alternative coordinated and ongoing actions at earlier stages of education. This means that Library and Information Science professionals will have to re-signify their discipline, in the understanding that their work transcends technical matters. They must create mechanisms for becoming cultural agents within educational institutions. This is about broadening the nature of their professional role within the information society, while centering their efforts in three functions: information, knowledge and learning.

To achieve these transformations in the way librarians work in academic contexts will demand joint, synergistic action among professors and directors targeted at developing key competencies for life-long learning.

Works cited

ACRL (Association of College and Research Libraries) (2000), *Information Literacy Competency Standards for Higher Education*. Accessed October 30, 2009. http://www.ala.org/ala/acrl/acrlstandards/informationliteracycompetency.html

Almind, T. C., and Ingwersen, P. (1997), "Informetric analyses on the World Wide Web: Methodological approaches to webmetrics." *Journal of Documentation* 53: 404-426.

Alvarado, G. (2007), "El concepto de competencia en la perspectiva de la educación superior." Paper presented at *Foro El concepto de competencia: su uso en educación técnica y superior*, Universidad Industrial de Santander, May 25, 2007. Accessed December 10, 2007. http://groups.google.com/group/alianza-agro/web

Álvarez Villar, V. M.; Orozco Hechavarria, O., and Gutiérrez Sánchez, A. (2011), "La formación de competencias investigativas profesionales, una mirada desde las ciencias pedagógicas." *Cuadernos de Educación y Desarrollo* 3 (24): 1-10. Accessed January 22, 2013. http://www.eumed.net/rev/ced/24/vhs.pdf

Alzate, G., and Peña, L. B. (2010), "La tutoría entre iguales: una modalidad para el desarrollo de la escritura en la educación superior." *Universitas Psychologica* 9 (1): 123-138.

ALA (American Library Association) (1989), *Presidential Committee on Information Literacy: Final Report. Association of College and Research Libraries*. Accessed November 15, 2009. http://www.ala.org/ala/acrl/acrlpubs/whirtepaper/prsidential.ttml

Barbosa-Chacón, J. W.; Barbosa Herrera, J. C.; Marciales Vivas, G.-P., and Castañeda-Peña, H. (2010), "Reconceptualización sobre las competencias informacionales. Una experiencia en la Educación Superior." *Revista de Estudios Sociales* 37: 121-142.

Barbosa-Chacón, J. W.; Barbosa Herrera, J. C.; Marciales Vivas, G.-P., and Castañeda-Peña, H. (2011), "Dimensión Sociocultural de la Competencia Informacional. Una experiencia de Reconceptualización y Caracterización en el contexto universitario." Paper presented at *Primera Jornada Nacional de Alfabetización Informacional-ALFIN*, Universidad Nacional de Cuyo, Mendoza, Argentina, November 17-18, 2011.

Barbosa-Chacón, J. W.; Barbosa Herrera, J. C.; Marciales Vivas, G.-P., and Castañeda-Peña, H. (2012), "Observación de la Competencia Informacional en Estudiantes Universitarios." Paper presentes at *XII Congreso Internacional de Información*, Instituto de Información Científica y Tecnológica (IDICT) del Ministerio de Ciencia, Tecnología y Medio Ambiente de la República de Cuba, La Habana, Cuba, April 14-18, 2012.

Bernhard, P. (2002), "La formación en el uso de la información: una ventaja en la enseñanza superior. Situación actual." *Anales de Documentación* 5: 409-435. Accessed January 12, 2013. http://revistas.um.es/index.php/analesdoc/article/viewFile/2271/2261

Batellino, L. J., and Lissera, R. G. (2006), "Nivel de información de los estudiantes de la carrera de Odontología (Universidad Nacional de Córdoba) acerca del conocimiento, metodología e investigaciones científicas." *Educación en Ciencias de la Salud* 3 (1): 27-33. Accessed January 12, 2013. http://www2.udec.cl/ofem/recs/anteriores/vol312006/RECS3106.pdf#page=27

Broad, J. (2006), "Interpretations of independent learning in further education." *Journal of Further and Higher Education* 30 (2): 119-143. Accessed January 15, 2013. http://santersero.pbworks.com/f/Interpretations%20of%20independent%20learning.pdf

Cabra-Torres, F., and Marciales Vivas, G. P. (2009), "Mitos, realidades y preguntas de investigación sobre los "Nativos Digitales": Una revisión." *Universitas Psychologica* 8 (2): 323-338. Accessed January 15, 2013. http://revistas.javeriana.edu.co/index.php/revPsycho/article/view/476

Cardinale, L. (2007), "La lectura y escritura en la universidad. Aportes para la reflexión desde la pedagogía crítica." *Pilquen* 8 (3): 1-5. Accessed January 14, 2013. http://www.revistapilquen.com.ar/Psicopedagogia/Psico3/3_Cardinale_Lectura.pdf

Castañeda-Peña, H.; González Niño, L.; Marciales Vivas, G. P.; Barbosa-Chacón, J. W., and Barbosa Herrera, J. C. (2010), "Recolectores, Verificadores y Reflexivos: perfiles de la competencia informacional en estudiantes universitarios de primer semestre." *Revista Interamericana de Bibliotecología*, 33 (1): 187-209.

Corona Rodríguez, J. M. (2012), "Acercamientos y propuestas de investigación sobre el consumo y la producción de información en internet. El prosumidor como concepto clave en la construcción social de la tecnología." *Question* 35 (1): 62-72. Accessed January 10, 2013. http://www.perio.unlp.edu.ar/ojs/index.php/question/article/view/1570/1351

De la Orden, A. (2007), "El Nuevo Horizonte de la Investigación Pedagógica." *Revista Electrónica de Investigación Educativa* 9 (1): 1-22. Accessed January 26, 2013. http://www.redalyc.org/articulo.oa?id=15590110

Dochy, F.; Segers, M., and Dierick, S. (2002), "Nuevas vías de aprendizaje y enseñanza y sus consecuencias: Una nueva era de evaluación." *Revista Docencia Universitaria* 2 (2): 13-30. Accessed January 26, 2013. http://dialnet.unirioja.es/servlet/articulo?codigo=258915

Durán Gisbert, D., and Huerta Córdoba, V. (2008), "Una experiencia de Tutoría entre iguales en la Universidad mexicana de Oaxaca." *Revista Iberoamericana de Educación* 48 (1): 1-12. Accessed January 26, 2013. http://www.rieoei.org/expe/2693Duran-Maq.pdf

Eshet-Alkalai, Y. (2004), "Digital literacy: A conceptual framework for survival Skills in the Digital Era." *Journal of Educational Multimedia and Hypermedia* 13 (1): 93-106.

Eveland, W. P., and Dunwoody, S. (2001), "User control and structural isomorphism or disorientation and cognitive load? Learning from the web versus print." *Communication Research* 28 (1): 48-78.

Fainholc, B. (2004), *Lectura Crítica en Internet. Análisis y utilización de los recursos tecnológicos en Educación.* México: Homo Sapiens Ediciones.

Ferrer, J. (2003), "La acción tutorial en la universidad." In *La tutoría y los nuevos modos de aprendizaje en la universidad,* compiled by Francisco F. Michavila Pitarch and Javier García Delgado, 67-84. Madrid: Consejería de Educación, Cátedra Unesco de la Universidad Politécnica.

Fitzgibbons, M. (2008), *Implications of Hypertext Theory for the reading, organizational and retrieval of information.* Accessed January 22, 2013. http://www.webpages.uidaho.edu/~mbolin/fitzgibbons.htm

Garmendia Bonilla, L. (2005), "La alfabetización informacional como estímulo investigativo: Una estrategia en la gestión de la información y el conocimiento." *Biblios* 6 (21): 1-12. Accessed January 24, 2013. http://dialnet.unirioja.es/servlet/articulo?codigo=1281417

Giurgiu, L. and Barsan, G. (2008), "The Prosumer-Core and consequence of the web 2.0 era." *Revista de Informatic Social* 9: 53-59. Accessed January 10, 2013. http://www.ris.uvt.ro/wp-content/uploads/2009/01/giurgiubirsan.pdf

González Jiménez, O. (2010), "Aprender a aprender, una necesidad de los estudiantes de la Facultad de Agronomía de Montaña de San Andrés, Pinar del Río." *Pedagogía Universitaria* 15 (2). Accessed January 11, 2013. http://cvi.mes.edu.cu/peduniv/index.php/peduniv/article/view/534

González Moreno, C. X. (2012), "Formación del pensamiento reflexivo en estudiantes universitarios." *Revista Internacional de Investigación en Educación* 4 (9): 595-617. Accessed January 14, 2013. http://redalyc.uaemex.mx/redalyc/pdf/2810/281022848005.pdf

González Niño, L.; Marciales Vivas, G. P.; Castañeda-Peña, H.; Barbosa-Chacón, J. W., and Barbosa Herrera, J. C. (2013), "Competencia informacional: desarrollo de un instrumento para su observación." *Lenguaje* 41 (1): 105-131.

Greimas, A. J. (1989), *Del sentido II: ensayos semióticos.* Madrid: Gredos.

Griffin, M., and Griffin, B. (1998), "An Investigation of the Effects of Reciprocal Peer Tutoring on Achievement, Self-Efficacy, and Test Anxiety." *Contemporary Educational Psychology* 23 (3): 298-311. Accessed January 15, 2013. http://www.sciencedirect.com/science/article/pii/S0361476X98909717#pdf

Gualdrón, L., and Rey, R. (2002), *Construcción de Materiales de Autoaprendizaje.* Bucaramanga-Colombia: Ediciones Universidad Industrial de Santander.

Hernández Hernández, P. (2001), *Psicología de la educación.* México: Trillas.

Hofer, B. K. (2004), "Epistemological Understanding as a Metacognitive Process: Thinking Aloud during Online Searching." *Educational Psychologist* 39 (1): 43-55.

Marciales Vivas, G. P. (2003), "Pensamiento crítico: diferencias en estudiantes universitarios en el tipo de creencias, estrategias e inferencias en la lectura crítica de textos." PhD diss., Universidad Complutense de Madrid. Accessed January 14, 2013. http://eprints.ucm.es/tesis/edu/ucm-t26704.pdf

Marciales Vivas, G. P.; González Niño, L.; Castañeda- Peña, H., and Barbosa Chacón, J. W. (2008), "Competencias informacionales en estudiantes universitarios: una reconceptualización." *Universitas Psychologica* 7 (3): 613-954.

Marciales Vivas, G. P.; Peña, L. B.; Castañeda-Peña, H.; González Niño, L.; Barbosa-Chacón, J. W., and Barbosa Herrera, J. C. (2010), *Competencias Informacionales en estudiantes universitarios: Aportes para su caracterización y desarrollo.* Lima, Perú: Pontificia Universidad Católica del Perú. (Serie Temas de Bibliotecología e Información.)

Marciales Vivas, G. P.; Cabra, F.; Castañeda-Peña, H.; Peña, L. B.; Mancipe, E., and Gualteros, N. (2013), *Nativos digitales: transiciones de lo impreso a lo digital.* Bogotá: Editorial Pontificia Universidad Javeriana.

Marcos, A. (2011), "Aprender haciendo: Paidea y Phronesis en Aristóteles." *Educação* 34 (1): 13-24.

Montiel-Overall, P. (2007), "Information Literacy: Toward a Cultural Model." *Canadian Journal of Information and Library Science* 31 (1): 43-68.

Newman, D. P.; Griffin, P., and Cole, M. (1998), *La zona de construcción del conocimiento,* 3rd. edition. Madrid: Ediciones Morata.

Ochoa Angrino, S., and Aragón Espinosa, L. (2007), "Funcionamiento metacognitivo de estudiantes universitarios durante la escritura de reseñas analíticas." *Universitas Psychologica* 6 (3): 493-506.

Penzo, W.; Fernández, V.; García, I.; Gros, B.; Pagés, T.; Roca, M.; Vallès, A., and Vendrell, P. (2010), *Guía para la elaboración de actividades de aprendizaje.* Barcelona: Editorial Octaedro. Accessed January 15, 2013. http://www.octaedro.com/ice/pdf/16515.pdf

Peña, L. B. (2009), *Indagar es preguntarse.* Colombia: Pontificia Universidad Javeriana, Facultad de Psicología. Internal publication.

Prensky, M. (2001), "Digital natives, digital immigrants." *On the Horizont* 9 (5): 1-6.

Raij, K. (2007), *Learning by Developing.* Finlandia: Laurea Publications. Accessed January 15, 2013. http://markkinointi.laurea.fi/julkaisut/a/a58.pdf

Rodríguez Cobián, A. A. (2009), "El trabajo independiente en los estudiantes de Medicina y la enseñanza de la propedéutica clínica, en el contexto del policlínico universitario." *Ciencia y Sociedad* 35 (1): 133-146. Accessed January 15, 2013. http://www.redalyc.org/articulo.oa?id=87014565007

Rosales, Horacio (2008), *¿Qué es competencia? Módulo de actores Alianza Agroindustrial Santander.* Colombia: Universidad Industrial de Santander. Accessed December 15, 2008. http://alianzaagroindustrial.blogspot.com/2008/02/mdulo-para-la-formacin-de-los-actores.html

Serrano Orejuela, E. (2003), *El concepto de competencia en la semiótica discursiva*. Accessed April 6, 2010. http://www.geocities.com/semiotico

Serrano de Moreno, S. (2008), "El desarrollo de la comprensión crítica en los estudiantes universitarios. Hacia una propuesta didáctica." *Educere* 12 (42): 505-514. Accessed January 14, 2013. http://www.scielo.org.ve/scielo.php?pid=S1316-49102008000300011&script=sci_arttext

Serrano de Moreno, E., and Peña González, J. (2003), "La escritura en el medio escolar: un estudio en las etapas." *Educere, Investigación Arbitrada* 6 (20), January-February-March: 397-408. Accessed May 5, 2013. http://www.saber.ula.ve/bitstream/123456789/19747/1/articulo6.pdf

Spivey, N. N., and King, J. (1989), "Readers and writers composing from sources." *Reading Research Quarterly* 24 (1): 7-26.

Topping, K. J. (1996), "The Effectiveness of Peer Tutoring in Higher and Further Education: A typology and review of the literature." *Higher Education* 32 (3): 321-345.

Unesco (2006), *Information literacy: An international state-of-the art report*. Accessed August 26, 2006. http://www.uv.mx/usbi_ver/unesco

Uribe Tirado, A. (2010), "La alfabetización informacional en la universidad: descripción y categorización según los niveles de integración de ALFIN: caso Universidad de Antioquia." *Revista Interamericana de Bibliotecología* 33 (1): 31-83. Accessed January 14, 2013. http://www.scielo.org.co/pdf/rib/v33n1/v33n1a02.pdf

Valverde Berrocoso, J., and Garrido Arroyo, Ma. del C. (2005), "La función tutorial en entornos virtuales de aprendizaje: comunicación y comunidad." *RELATEC: Revista Latinoamericana de Tecnología Educativa* 4 (1): 153-167

Van Deursen, A., and Van Dijk, J. (2008), "Measuring Digital Skills." Paper presented at *The 58th Annual Conference of the International Communication Association*, International Communication Association (ICA), Montreal, Canadá, May 22-26, 2008.

Vásquez, A. (2008), "La producción de textos académicos a partir de fuentes múltiples y aprendizaje en la universidad: estrategias de la tarea, dificultades de los estudiantes." In *Desafíos de la lectura y la escritura en educación superior: caminos posibles,* 21-50. Cali, Colombia: Universidad Autónoma de Occidente.

Vonderwell, S. (2003), "An Examination of asynchronous communication experiences and perspectives of students in an online course: a case study." *The Internet and higher education* 6: 77-90. Accessed January 10, 2013. http://www.anitacrawley.net/Articles/Vonderwell(2003).pdf

Wenger, E.; McDermott, R., and Snyder, W. (2002), *Cultivating communities of practice*. Boston: Harvard Business School Press.

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Organization knowledge on the digital network

Mary Eugenia Luna González *

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Abstract

This paper presents a documental analysis for the purpose of understanding how knowledge in digital document repertories is organized, specifically those hosted on the digital network. The study is carried out on the basis of an analysis of the knowledge within these information systems, in which the sociocultural context of the creator and the subset of values and beliefs shared by the personnel representing this creator necessarily intervene in conjunction with the informational needs of the end user of the information product offered by the knowledge organization. The paper also discusses the relationship existing between the user and the digital network knowledge retrieval system.

* Ministerio de Petróleo y Minería, Venezuela. malunag2000@yahoo.com

Keywords: Organization of the Knowledge; Context; Digital Network; Recovery of the knowledge; Representation.

Resumen

Organización del conocimiento en la red digital
Mary Eugenia Luna-González

Se realiza un análisis documental que permite conocer el estado de la organización del conocimiento en la documentación encontrada en la red digital, partiendo del análisis del conocimiento dentro de dichos sistemas informativos. Intervienen en ello el contexto sociocultural en el que se desenvuelve el creador del conocimiento y el conjunto de valores y creencias que comparte el personal que lo representa, así como las necesidades informativas de los usuarios finales de la información que es resultado de la organización del conocimiento. De igual manera se aborda la relación existente entre el usuario y los sistemas de recuperación del conocimiento en la red digital.

Palabras clave: Organización del Conocimiento; Contexto; Red Digital; Recuperación del Conocimiento; Representación.

Introduction

Over recent years, technological transformation and advancements have determined how information and knowledge are created, recorded and accessed. Using documental languages based on concepts and controlled or uncontrolled terminologies, the organization of knowledge serves as a representation of such knowledge and information. These languages depend on the reality of professionals in charge of representing said knowledge and on the socio-cultural milieu in which they work. The diverse contexts are determined by socio-economic, political and social-cultural circumstances of the professional, which means there will be diverse approaches to analysis, interpretation and representation of knowledge. The task of representing knowledge is a process performed by the document professional, who stands astride knowledge as an information product and the end user.

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On this basis, the objective of this paper is to achieve an understanding of how knowledge is organized in the documental repertories found online. For the purpose of establishing a conceptual framework for the topic under study, the methodology consists of documental examination and analysis of specialized literature, including both online and printed sources. This approach provides terminological mastery, allowing conclusions to be drawn about the organization of knowledge on the internet.

Organization of Knowledge

Within the information sciences, the discipline of knowledge organization is takes on the task of studying the treatment of knowledge, and the construction and control of the language and instruments used in the process of representing documents that are the products of human knowledge, thereby allowing retrieval by users of these documents. This organization of knowledge is a process in which the document or information professional serves as an intermediary by creating the representation of the knowledge product for the benefit of the user.

Specifically, librarians, archivists and other specialists that organize knowledge create document descriptions, indexations, bibliographic data bases, archives and other types of "Institutional Memories" (Hjørland, 2008: 86). With regard to documents, information and knowledge, Vizcalla Alonso has stated that:

> [The] organization of information has been directly associated with the stage known as information processing and has been framed within the traditional aspects of the same. Generically, these activities may be summed up as anything associated with the description of the form and content of the documents included in the system. (1997: 166)

Organization of knowledge establishes systems for representing the reality of the author of such knowledge for the purpose or allowing the end user to access it and understand the context in which the specific knowledge product was created. These systems contemplate documental languages, as cited by Civallero (2005: 1): "[documental languages] undergo transformation from the intermediary to the user, the former codifying both the content of a text the user's search prompts." Gil Urdiciain (1996: 1) defines documental language as: "any artificial, standardized system of signs used to facilitate the formal representation of content of documents and thereby

allowing such information to be retrieved either manually or automatically by the user."

Since documental language is the intermediating factor between the information and the user, it appears inherently subjective to the user, because the representations made in the documental language are immersed in a context and reflect the ideologies of the knowledge organizers.

Context and ideology in the organization of knowledge

Documental professionals and others in charge of representing knowledge perform an intermediary task between the documentation and the final users. To this end they employ controlled languages that attempt to ensure neutrality, but in reality they provide records and summaries loaded with subjectivity, if for no other reason than they are human and have developed personally and professionally within a specific environment.

Context plays a fundamental role in the description and representation of written information, because it involves social and cultural facets. The language used in the discourse of authors of knowledge and that of final users varies in accord with ideologies and contextual relationship. Consequently, as Moreiro states:

> The tasks of selecting and attributing terms by information professionals is based largely on the cultural context to which they belong and their experience as interlocutors, rather than on the needs of the user. These tasks are performed within the universe of possibilities for representing the selected concepts, ranging from controlled vocabularies through all of the possible circumstances that bring them to the decisions to include a representation term for the original content all the way to free languages. (cited from Bufrem, Silva and Breda (2005: 124. Translated from Spanish)

In this regard, Van Dijk (cited in Silva, 1997) states that all levels of discourse contain contextual fingerprints, such as gender, class, ethnicity, age, origin, position and other group identifiers; and these play a fundamental role in representation. In this way, the physical paradigm demands the professional mediator represent information in a scientific, controlled way, even when the primary source's use of language is not deployed and structured in this way. Human nature, however, does not lend itself to neutral, objective transcriptions. These professionals, therefore, are prone to include elements from their reality in anything they

attempt to represent. Actual practice seems to contradict the idea of organizing information in terms of the user's needs to retrieve and exploit information.

Similarly, the practice of using controlled languages to confer neutrality on representations of knowledge relies on rigid guidelines of the physical paradigm. The crisis in the paradigm stands in high relief when we look at the "gulf that exists between the opinion of researcher and practitioner, who believe the work of our professionals is neutral and innocuous" (García Gutiérrez, 2001: 3. Translated from Spanish).

Since ideology determines the language used by the author and mediator, one might assert that it is understood as a subset of values and beliefs shared by the members of a given society and it is assimilated by the members unconsciously, thereby becoming their conception of reality, while serving to model the identity and inform the personality (Civallero, 2005).

This ideological *schemata* structures the opinion of persons about a wide range of specific topics, while also motivating the way they act. When negative connotations of ideas are presented, these persons may respond aggressively or discriminatively toward the groups they presume are making such asseverations.

As stated by Civallero (2005: 3. Translated from Spanish), in diverse controlled language tools, we can see that such negative connotations are considered unbiased:

> A documental work tool used internationally includes, representative, unambiguous and relevant descriptors controlled by professionals to classify entire peoples and races as "colonial" or "primitive" (in contrast to "developed" or "highly developed," which are also included). These labels imply the establishment of mental and physical differences that widen the gap existing between human beings. In this way the politics of hate, marginalization, dominance and scorn are perpetuated, all of which are and have been the hallmarks of human history. What is perhaps even more worrisome is that these labels, these descriptors, have been deemed "neutral" by the society creating the documental language. What is more, these terms are deemed necessary, pertinent, important and objective for classification and understanding of certain human groups.

Since the information professional will always make decisions regarding the relevance of online information, and objective, neutral representations are not possible; the idea that such organization is actually performed on the basis of the needs users is not credible.

The organization of knowledge online

With the evolution of new IC technologies, representation and organization of knowledge, and storage and access processes have also undergone significant change.

One of these technologies is the digital network, a mechanistic invention developed to control the rapid growth of knowledge. It is understood as an open information system by which upload and update of knowledge to the representation system allows individuals and specialists to interact with each other and publish documents on specific topics. This process, at the end of the day, causes information overload and in fact can overload the digital system.

In this sense, the organization of knowledge on digital networks provides direct access through a single platform. Since the knowledge available in information systems consists of codified mediations of real products, these real products are decontextualized; and it falls to the user to learn how to refine search parameters in order to find relevant information.

The selection and analysis work of documental professionals to represent and disseminate information through material and technological supports is done for the purpose of creating a resources for source for users. Chacón Gutiérrez (1995) states that this process is abstract, in that it uses a series of codes in the storage, search and retrieval system; and it is anonymous, in that the analyst and final user do not know each other and are unaware of one and other's needs. Thus, the user delegates his search to another individual, who is unaware of the reasons motivating the search

The abstract procedure of organizing knowledge on the web, in which codes or metadata are assigned to the document in order to make it more explicit and easy to represent, index and subsequently search, is done without a set of standardized procedures. In terms of products, this can lead to less than complete representations. In this regard, Codina states that "[...] people make mistakes and webpage makers make mistakes: they forget to use metadata, they transcribe these erroneously, they use them on some pages and not on others, and they make spelling errors […]" (2003: 151. Translated from Spanish).

In sum, indexing of intellectual production and knowledge on said servers is performed by a large number of experts in charge of selecting, simpli-

fying and representing documentation published by specialists and authors writing on a given topic, which causes said information to be distorted or manipulated by the person performing the mediation task. In this way the original concepts may be changed by a mediating context that is distinct from the original context of the producer. This change can exert an effect on the results a user gets from the search process.

Organization of knowledge in digital informational retrieval systems

Results coming from search engines are the product of textual coincidences, rather than of content or the interrelation of said terms. In this sense, no logical retrieval mechanism exists, because the search is divorced from semantics. Consequently, the system links to terms that oversaturate and obstruct useful information retrieval often yielding without any relevance to the topics searched, or with genuine results buried under mountains of superfluous or inappropriate information. The user, then, will often abandon the search in the belief that these electronic systems are without scientific foundation and cannot meet the information demands with a reasonable investment of time and effort.

Indexes developed by documental personnel working for online information retrieval companies do not make distinctions between the diverse users they serve. On the other hand, the user secures information that has not been tailored to his needs because he enjoys free access to the data. According to García Gutiérrez (2001: 6. Translated from Spanish): "there is no innovation in the knowledge organization logic, which conservatively preserves the classic structures and it is the support itself that determines what is changed." With regard to the documental languages used to index documentation in electronic search engine sites, these can be manipulated for any of the following reasons (Chacón Gutiérrez, 1995).

1. Like the creator of the documental language, the analyst is immersed in a society that imposes ideological and cultural models.
2. In intellectual operations, the documental mediator's subjectivity influences the selection of document topics and key words or descriptors used in representation.
3. The documental language is codified and, even though the user and documental intermediary share documental codes, such codes are subject to the bias of the person performing the mediation.

4. As a process in which the natural language is converted to documental language, indexing may fail to reflect the implicit connotation of the original language and the socio-cultural context where it was produced. Likewise, the lack of knowledge of the indexer can have a negative influence on the choice of concepts and keywords used in the documentation.

García Gutiérrez (2001: 5-6. Translated from Spanish) states: "for now, the hypertext does not go beyond the old systematic or rotated indexes. It is nothing more than a chaotic transversal index with special effects."

The user-system interaction in information searches is more productive when the user is capable of articulating his information needs in a way that coincides with the index representation language used. This means, of course, that such searches will be limited by the features of the representation language, because electronic online information retrieval systems use diverse processes to perform searches. One such method of retrieval is performed by means of logical search, in which Boolean operators are used to associate and combine terms in a logical way. These terms are generally *and, or* and *not*.

The conjunction or logical intersection *and* is used to associate two or more terms required to appear at the same time in the documents. The logical sum *or* is used to search documents containing one or all of the search terms. The logical negation *not* is used to exclude documents containing a given term (Lancaster and Pinto, 2001).

Likewise, searches carried out with information retrieval systems using free text, with words and phrases in natural language, yields term coincidences in the title and body text of the document. With this procedure, the strategy to achieve the search consists of phrases the user believes are relevant to his needs.

The advantage provided by the use of free, natural language for searches resides in being able to perform searches that are more narrowly targeted than searches using controlled language, while nonetheless reaping results with the user's phrases that coincide with the documental language of the professionals who perform the subjective representations that otherwise might interfere with the neutrality in the organization of knowledge.

Neutrality in the online organization of knowledge

There is a relationship between the socio-cultural context and the expression of knowledge represented in the documental discourse. This relationship is built by the individual participants in said discourse, with each individual having his or her own interpretation of the context in which he is immersed.

The persons processing the documental content online do not make distinctions between the client users. Since the user enjoys free access to the content of said data bases, he receives information that is not tailored to needs. This is because information professionals cannot make neutral, objective representations that are uninfluenced by the subjectivity inherent in their life and work realities.

In this regard, Chacón Gutiérrez (1995. Translated from Spanish) has made the following observation regarding description and indexing:

> Because it is an intellectual activity, the analyst's subjectivity is decisive in the selection of topics contained in a document and in the selection of descriptors or key words to represent them. The documental professional acts as an end reader of the primary document, interprets the document he receives and sends the content (sender-intermediary) translated in the codified language (co-author).

This is why the documental analysis and indexing performed by documentation professionals entails simplified representations of the work of authors on specific topics in order to make them available to web users. Consequently, the documental analysis and representation may distort or manipulate information in the process of aligning terms and concepts with his or her reality.

With regard to manipulation that occurs in the indexing process when natural language is translated to documental language, Chacón Gutiérrez (1995. Translated from Spanish) states:

> The secondary document translated from the primary document is an intermediary between the user and the original. If it has been manipulated during the indexing process, the user is also manipulated. The manipulation may arise from unresolved problems inherent in all translations, such as lack of fidelity to the

> original; failure to find equivalencies between natural and documental languages; failure to convey implicit connotations of the original or those of the socio-cultural context of the author; or when the indexer's subjectivity or lack of inurnment negatively influence the selection of concepts existing in the document or key works or descriptors to represent these topics.

Influenced by their social cognitions, documental professionals read the primary document, assuming the standards, values, objectives and socially shared interests these contain in order to provide the foundation for drafting the secondary document. In this way they become co-authors of the final information made available to the user. "The data offered by a Documentation Center are often not verified by users. The users are subject to a double manipulation, that of the secondary document and that of the primary document on which the former is based" (Chacón Gutiérrez, 1995. Translated from Spanish). Similarly, Bufrem, Silva and Breda (2005: 123. Translated from Spanish) observe:

> [...] when the mediator or interlocutor reader interprets a text for subsequent representation, he must conceive of it as socially situated and targeted at an exact moment, and he must accept that the structure of the enunciation is determined by the most immediate social situation and the larger social medium.

With regard to searches in the digital sphere, documentation is made searchable through representations in the search engine and the use of specific key words chosen from those available and belonging to a social subset. As such, the concept selection process performed by documental specialists or information professionals within a search website is based on their own socio-cultural context and experiences rather than on the needs of the users. As stated by Moreiro (cited in Bufrem, Silva and Breda, 2005), such tasks are performed within a universe of possibilities for the representation of selected concepts, spanning the continuum from controlled languages to free languages, and entailing circumstances that determine whether to include one term or another to represent the knowledge (Moreiro, cited in Bufrem, Silva and Breda, 2005).

Finally, when the user performs an information search, the coincidence of concepts (as distinct from content) in electronic retrieval systems yields irrelevant information, while ignoring content relevant to the search intention. These results interfere with the neutrality of the information represented.

Conclusions

1. Representation of knowledge is the manifestation of thought that is expressed through language, which allows how individuals reproduce thought as members of a given socio-cultural group to be deciphered.
2. Organization of knowledge is a field that plays a fundamental role in the general access to and exchange of knowledge and information. It rests on the technological networks used to retrieve represented information, though the terminology and content used in these sites must be entrusted to professionals in the field of information science.
3. The participants in the documental discourse build the relationship between the social-cultural context and its expression, while each mediator creates representations in accord with his particular context and individual reality, meaning such representation cannot be completely neutral.
4. Some measures are needed to control the documental representation tools that pretend to be neutral but which are in fact imbued with bias and/or negative or discriminatory connotations with regard to specific socio-cultural groups.
5. Traditional human activities are increasingly being performed using computerized media. Professionals in the area of information are focused on applying information and communication technologies and the tasks of interpretation and semantic analysis of content is often afforded a secondary status.
6. With the advent of the internet and as a function searches performed, the relationship between the knowledge producer and the end user has intensified. Searches in which the indexers employs both standardized and free languages are never free of the personal context, and this will for the most part cause results to be based on word coincidences rather than on semantics that best match the needs of the user.
7. Despite the advantages offered by the use of Boolean operators in searches of knowledge in digital information retrieval systems, users are often not very familiar with their correct use and combination. This causes the system to yield incorrect or unwanted information.
8. When using Boolean logic in interactive digital information systems, users often fail to represent information needs properly, which sometimes leads to the search failing to yield useful, relevant information.

9. Free searches can be more specific than those performed with controlled languages, but they often exert an effect on retrieval neutrality leading to irrelevant results and exclusion of relevant information.
10. The organization of content on the web is threatened when the personnel of the information indexing are unaware of user needs and injects personal bias into their analyses.

Works cited

Bufrem, L. S.; Silva H. F., and Breda S. M. (2005), "Reformulación de los elementos teóricos de la organización del conocimiento: bases lingüísticas y culturales y estructuras de representación." In *ISKO, capítulo español. Congreso 7º*, 121-127. Barcelona.

Chacón Gutiérrez, I. (1995), "La mediación documental." *Cuadernos de Documentación Multimedia* 4. Accessed January 10, 2011. http://www.ucm.es/info/multidoc/multidoc/revista/cuadern4/chacon.html

Civallero, E. (2005), "Espinas ocultas: lenguajes documentales, ideologías negativas y revisiones." *Fuentes del Congreso. Boletín de la Biblioteca y Archivo Histórico del H. Congreso Nacional de Bolivia* 4 (20). Accessed January 10, 2011. http://issuu.com/bib.csinfo/docs/civallero__2005

Codina, L. (2003), "La web semántica: una visión crítica." *El Profesional de la Información* 12 (2) (May-April): 149-152.

García Gutiérrez, A. (2001), "Redes digitales y exomemoria." Paper presented at *I Congreso Ibérico de Comunicación. La Sociedad de la Comunicación en el siglo XXI*. Universidad de Málaga, Málaga, May, 2001.

Gil Urdiciain, B. (1996), *Manual de lenguajes documentales.* Madrid: Noesis.

Hjørland, B. (2008), "What is Knowledge Organization (KO)?" *Know-ledge Organization* 35 (2-3): 86-101.

Lancaster, F. (1995), *El control del vocabulario en la recuperación de información*. Valencia: Universidad de Valencia.

Lancaster, F., and Pinto, M. (2001), *Procesamiento de la información científica*. Madrid: Arcolibros.

Silva, O. (1997), "El estudio del discurso en el camino de Teun Van Dijk." *Revista Frontera* 16: 97-106. Universidad de la Frontera, Temuco.

Sojo, V. (2008), *Normas de la American Psychological Association (APA) para las citas y referencias bibliográficas.* Caracas: Escuela de Psicología, U.C.V.

Van Dijk, T. (2001), "Algunos principios de una teoría del contexto." *Revista Latinoamericana de Estudios del Discurso* 1 (1): 69-81.

Vizcalla Alonso, D. (1997), *Información: procesamiento de contenido.* Argentina: Parhadigma Ediciones.

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Disposal of documents: a proposal for libraries

Gabriela Mansilla *
Marcela Verde

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Abstract

In this article we develop a methodological approach for the task of discarding documents as well as indicators for evaluating the results of the procedure. Since library collections undergo continuous growth, whether by purchase, exchange or donation of material in diverse supports, the technical, operational and facilities of the organization must have great deal of flexibility. To provide shelf space for new items, existing material is often shifted to other spaces on the fly, a situation that highlights the need for the development

* The authors are researchers at the Universidad Católica de Córdoba, Argentina. (gmansilla05@yahoo.com.ar); (marcelabverde@gmail.com).

of a collection policy that is responsive to the requirements of users, the library services provided and the objectives set for the development of a collection that is flexible, useful and up to date.

Keywords: Expurgation; Discard; Development collection; Collection development policy; Criteria for expurgation; Evaluation of the collection.

Resumen

Descarte de documentos: una propuesta metodológica para bibliotecas
Gabriela Mansilla y Marcela Verde

En este artículo se desarrolla una propuesta metodológica para abordar la tarea de descarte y se sugieren indicadores para evaluar los resultados del procedimiento, considerando que las colecciones en las unidades de información crecen permanentemente por la incorporación de bibliografía en diversos formatos y por diferentes medios (compra, canje y donación). Esto genera un importante movimiento, tanto de orden físico como de organización técnica y operativa; las dificultades que suelen presentarse con relación a los espacios se resuelven sobre la marcha y por lo general se requiere reacomodar y redistribuir el material que ya se encuentra en las estanterías para dar lugar a lo nuevo.

Se plantea también la necesidad de establecer una política de desarrollo de colecciones como una guía o marco que permita dar lineamientos para que la biblioteca pueda llevar adelante un desarrollo de colecciones acorde a los requerimientos de los usuarios y a los servicios que brinda, dando la movilidad necesaria para contar siempre con colecciones actualizadas y útiles al público.

Palabras clave: Expurgo; Descarte; Desarrollo de colecciones; Política de desarrollo de colecciones; Indicadores.

Introduction

The ongoing need to reorganize library collections in order to ensure conservation and access because of space considerations inevitably leads to the adoption of collection development policies that include both selection for inclusion and selection for discard. Such policies are important aids to libraries that receive additions to their collections, through donations, swaps and acquisitions throughout the year.

Donations demand special treatment because libraries often assume the duty to preserve such materials. On other occasions the library receives donations from individuals; and they must be free to dispose of such materials as they see fit. In contrast to purchases, these unplanned acquisitions bring with them issues of storage, technical processing and workload, especially where special care is required.

Library collections occupy all available space, though such space is often filled with superfluous, dated and largely unused materials, perhaps in poor condition as well. Such circumstances undermine the value of a documental collection. In order to develop an up-to-date, attractive collection with historical and artistic values that are useful to the user public is a considerable undertaking in terms of physical space, technical organization and the operations entailed in processing the documents and loading them to data bases.

The continuous growth in the numbers of documents requires any library to adopt policy guidelines to impose order on growth of the collection. The collection management policy and associated guidelines should clearly state the objectives and services provided and an explanation of its place within the library in terms of the duties it will discharge. The collection development or management policy should be studied and analyzed as a unit and it must inform each of work policies adopted. Any such policy must consider the selection of information sources, the means of acquisition, preservation and the eventual *discard* of unwanted materials. The question of discard is key to ensuring the dynamics of collection turnover and updating in a library. Varela (2000: 6. Translated from Spanish) has stated:

> Because the library is a dynamic organism in continuous growth, there are portions of the collection that fall into disuse, largely because of scientific obsolescence and consequent removal from school curricula. […] The need to discard material is the price we pay for space limitations and the advancement of human knowledge.

The literature in this field is not particularly abundant, with several recent papers discussing general experiences in diverse libraries faced with such issues. These papers describe the motivations, methodologies and results of discard policy in action. Such is the case of Parejo *et al.* (2011); while Muñoz Choclán (2000: 1. Translated from Spanish) states:

> The scant literature and concrete examples of discard policy in our country have can explain the interest spurred by the this paper which describes the Discard Plan for the Bibliographic Collection of the Sevilla Public Library, which has been accepted by those in charge as the library moves to new a new building.

Other publications, in contrast, cite the development of collections or the creation of collection development policies, including matters of discard. Generally, however, these papers do not present methodologies or theoretical approaches to such matters (Varela, 2000; Corchuelo Rodríguez *et al*., 2012). The book *El expurgo en la biblioteca* (Gaudet and Lieber, 2000) and a somewhat older paper by Romero (1985) provide concrete, straightforward fundamentals of discard activities in libraries. Another interesting paper by Vall Casas (2006) provides a methodology specifically targeted to Catalan popular libraries, though the author take pains to suggest that it might be extended to other types of libraries.

Regarding correct terminology

The task of document discard can run into institutional resistance, arising perhaps from the memory of ill-conceived, indiscriminate expurgations as well as from internal politics and ideological infighting. Such things are not unknown in Argentina in recent times. Moreover, the book may be conceived of as "A perishable item, its paper subject to 'death' by being cut apart, mutilated, water-damaged or burned… In addition to these physical conditions, the content may also grow old." (Gaudet and Lieber, 2000: 17. Translated from Spanish). A discard policy must contemplate this circumstance and the fact that some documents never become discards because of the wealth of their content, the originality of format or prestige of the author, among other factors.

To discard is often used as a synonym of purge, a term that covers the gamut of actions from selection of material to be excluded from the collection or sent elsewhere. Notably, neither term has particularly positive con-

notations. Discarding is "the technical operation of critical assessment of the collection for the purpose of selecting materials, documents or titles for withdrawal" (Tejerina and Villarroel, n. d.: 2).

It may also be thought of as a negative, *a posteriori* selection (Gómez Hernández, 2002: 130), or inversely since it balances the collection as part of the selection process employed to incorporate material into the library. This negative selection rids the collection of dead weight, materials that are largely unused, useless and not part of the historical collection (Dobra, 1997). Librarians also speak of de-selection, relegation, rejection and withdrawal. All of these actions in varying ways refer to setting aside materials for the library collection in order to optimize the library's quality. The term to purge is idiomatically associated with to weed out, trim and the elimination of waste. In some sense it may be understood as purification or refinement of the collection.

To synthesize, discarding is the action of setting aside those materials that are no longer of use to users for diverse reasons. It is an action performed within the process of review of the collection for the purpose of making the collection more accessible, while improving its quality and adapting it to the changing needs of the user. It is also driven by the need to optimize space.

To carry out a purge safely and in line with a plan, a discard policy should be articulated and adopted as part of the overall policy of acquisitions and collection development, and in accord with space limitations, financial conditions and institutional climate. Moreover, this policy should state the criteria to be implemented and the final destination of the materials purged.

Using the IOUPI model

CREW (Continuous Review, Evaluation, and Weeding) known in France as IOUPI, is a practical manual for the critical review of collections. Published in French in 1986, it was originally targeted at small public libraries, but has since proven useful in other kinds of libraries. IOUPI is an acronym that brings together five criteria under which a given material may be discarded (Gaudet and Lieber, 1999):

I	Incorrect, containing false information
O	Ordinary, superficial or mediocre
U	Used, damaged or unattractive
P	Passé, obsolete.
I	Inadequate, doesn't belong to the collection

Methodological proposal

Inspired by the IOUPI approach, the methodology presented will serve as first filter, later to be followed by a close examination of the discard candidates by specialists. We have attempted to employ easily understood terminology for each of the criteria, even though it is not always easy for a librarian to know when material may be deemed incorrect, false, mediocre or inadequate, because such terms are no doubt subjective and may put personnel in difficult straits. Consequently, we have chosen to use most objective criteria to facilitate the activity.

By combining concrete, readily quantifiable criteria in each rubric, this proposal aims to facilitate the task of discard in libraries of all kinds, sizes and specializations. Moreover, each library can use the criteria it deems most pertinent to it needs. The proposal is not rigid. On the contrary, it attempts to be adaptable to the need of each library.

The IOUPI approach is limited to five criteria, something that might seem too narrow for larger libraries. Consequently, we propose eight negative criteria and one positive criterion, addressing the historical value of the material. Where historical value is found, the negative criteria are trumped and the material assessed is not purged, unless the library is not equipped for conservation or users are not interested in it. In such a case, the historically valuable material is donated to an institution that can preserve and make best use of it. The criteria consist of well-defined pairs that are conceptually related but can also be applied individually.

Negative Criteria	
O	Obsolete –Redundant in information
U	Unused-Duplicate
P	Not Pertinent-Poor quality
E	Physical Condition-Lack of space
Positive Criteria	
H	Historical value

The following is a brief definition of each criterion, divided into three kinds: objective, subjective and material. It should be stated that other interpretations of these criteria may exist.

Objective criteria

- *Obsolescence*: This often associated with content and format.
  - Obsolescence of content exists when the information contained is outdated and, consequently longer correct. Moreover, the material in question is without historical or research value. In university libraries, such material may be evaluated in terms of its relevance to academic or research programs. The date of publication, the material and type of monograph or book and the information contained may be taken into account.
  - Obsolescence of media support is invoked when the material requires special equipment for either reproduction or reading. When no such equipment is available, the feasibility of converting the material to another medium (for which there is equipment) should be considered.
- *Redundancy and availability* are determined by the coverage of information provided by other print and electronic media that are more up-to-date and otherwise more often used. The existence of copies of the material in other nearby libraries is also determined, especially when there are cooperative agreements in place.
- The criterion of *Use* serves to determine when a material falls out of use because of the changing interests of users. Moreover, any given material may never have been checked out or consulted. In this event, the reasons for its acquisition should be reviewed. In general terms, a material that has not been used in the first five years from its acquisition has about a 2.0% chance of ever being used. This qualifies the material for discard. The date of last use and the date of acquisition are the keys to this criterion.
- The criterion of *Duplicate* material is invoked when there are several tomes of the same title and edition. Distinct editions are considered different titles. The library determines how many copy it will keep on the shelves.

Subjective criteria

- *Pertinence* of content takes into accounts the relevance of the material to the curriculum and lines of research of the institution, while also

calling for assessment of datedness and obsolescence of the information. Some obsolescence may be reversed, as when cyclical fashions or trends come into play. Moreover, the historical value for future generations of an otherwise obsolete work must also be weighed

- *Quality of the information* is a sticky criteria, though such things as the author's prestige, the quality of the edition, the publishing house should be assessed in conjunction with experts.

Material criteria

- The criterion of *Space* includes matters of ease of access, and aesthetics and pragmatics of shelving arrangements. This criterion is also applicable to public access shelves. In general terms libraries should set aside space for materials to be acquired and added to the collection. This criterion should be applied in conjunction with other criteria, such as Obsolescence, Physical condition, etc.
- *Physical condition* examines supports materials that encumber proper use and in general terms detract from the aesthetics of the collection. Damaged material should be withdrawn from the open access shelves and any of the following options considered:
  - Withdraw the damaged material and replace it with a new copy when a newer edition is available, as cost considerations warrant, provided the material is in demand.
  - Implement conservation or restoration measures in order to make the damaged material available again, provided the cost of repair is lower than the cost of replacement, and/or no replacement is available in the market. In general terms, if the cost of rebinding is not more than one third of the price of purchase, rebinding is the best course.
  - Substitute the support material is a viable option whenever both cost and ensuring accessibility are duly considered. Purchase of substitution materials should never amount to more than 10-15% of the budget allocated to the area of knowledge.
- *Historical value* is closely linked to the type of library in question. This criterion involves both the cultural and monetary values of the material in question, in accord with Article Two of the National Law of Argentina 25197:

> ARTICLE TWO. For the purposes and effects of this law, "cultural assets" shall be understood as all those objects, artifacts and sites that constitute

the expression or testimony of human creation and the evolution of nature and that have exception archeological, historical, artistic, scientific or technical value. The universe of these assets shall constitute the cultural heritage of Argentina. "Cultural-historical-artistic assets" shall be understood as all those works of man and nature that are irreplaceable, whose uniqueness, unity, rarity and/or antiquity affords them exceptional universal of national value from the historical, ethnological or anthropological standpoint, including architectural works, sculpture and painting, and archeological artifacts.

Consequently, anything falling in any of the following categories shall be deemed a "cultural-historical-artistic asset":

1. The products of explorations, archeological and paleontological digs, whether performed on land or under water.
2. Those objects such as instruments of all kinds, pottery, engravings, coins, seals, jewels, weapons and funerary items.
3. Pieces proceeding from the dismemberment of historical monuments.
4. Materials of anthropological or ethnological interest.
5. Assets that refer to history, including the history of science and trades, and social, political, cultural and military history, as well as to the life of peoples and the national leaders, thinkers, scientists and artists.
6. The buildings comprising the architectural heritage of the Nation.
7. Assets holding artistic values, such as:
   -Paintings and drawings executed on any type of support and using any kind of media.
   -Etchings, stamps, lithographs, original silk screen prints, posters and photographs.
   -Artistic assemblages and installation in any media.
   -Artwork and crafts.
   -Statues.
   -Rare manuscripts and incunables, codices, books, documents and publications of special interest, whether separate or in collected.
   -Object of numismatic and philatelic interest.
   -Archive documents, including collections of texts, maps and other materials, cartographic materials, photographs, motion picture films, videos, sound recordings and the like.
   -Furnishings, musical instruments, tapestries, rugs and costumes.

The aforementioned criteria may be adjusted to each kind of documental material in libraries (books, magazines, videos, slides, maps, CDs, DVDs pamphlets, etc.). The following is the form used to apply the method:

Unique internal document identifier (inventory, bar code, ISBN, etc.)		Maximum score	Score attained
O	Obsolete –Redundant in information	2 points	
U	Unused-Duplicate	2 points	
P	Not Pertinent-Poor quality	2 points	
E	Physical Condition-Lack of space	2 points	
TOTAL			
H	Historical value		
Party in Charge			

Destination:	Internal relegation:	Restoration:	Sale:
Donation:	External relegation:	Destruction:	
Hist. collection:	Other support:	Swap:	

A form is used for each document. The first part of the form is used to record the score for each of the five criteria. The first four criteria are assigned two points, so that if a single criterion of the pair is deemed to exist one point is awarded, and when both are deemed to exist two points are scored. The historical value criterion is not scored. It is simply checked, which means the document assessed will not be purged, but rather donated to an institution better equipped to give it proper handling. Each library shall set the point threshold needed for a document to be considered for discard or further analysis.

The second part of the form is used to indicate the destination of the material under assessment. The diverse destination may be color coded or a letter code may be used so that such materials can be more easily assigned to shelves or storage boxes. A third part may be added for documents that have numerous tomes, such as duplicate copies of magazines, diskettes, slides and other such materials.

To summarize, the steps in the process are followed:

1. Before beginning the process one should analyze the viability of the discard action and ascertain whether there is a discard policy in place, become familiar with the respective legal framework, and determine the availability human economic and human resources (Vall Casas, 2006: 4).
2. Designate personnel. This kind of job is best performed in teams, with each team assigned to a sector, subject area or document type.

At least one person on each team should have a good knowledge of the collection and the needs of users.

3. Set the dates for launching and concluding the task. The purge process can take a significant length of time. As such, it may be best to carry out the task by sectors; for example, focusing only on magazines or a classification range or certain supports, etc.
4. To facilitate the task, one must take care that the sectors to be purged are in order. The sector may be immobilized for the term of the purge process, provided this kind of interference with lending services does no inconvenience users.
5. Ensure availability of the space and furnishings to hold purged materials, including shelves, carts, ladders, boxes, tables, etc.
6. Prepare a sufficient number of forms, markers and colors for identifying the destination of the purged material.
7. Compile a topographic list of documents that have not been used in recent years, setting the cutoff period in accord with the library's objective so that it can serve as a guide for the materials to be analyzed in the first place.
8. Begin the review task shelf by shelf, pulling documents that appear on the list (*Use* criterion), while also applying other criteria, and marking the document destination and placing the material in the assigned place. Likewise, the state of preservation of the materials not on the list should be scrutinized and the repair needs assessed.
9. Perform a count by destination of the material withdrawn.
10. Before definitively withdrawing material, one may consult specialized bibliographies or specialists in order to make a final decision regarding its removal.
11. The library requests authorization before the competent authority to discard material before taking further action.
12. Once the destination of the materials is decided and authorization is secured, the definitively purged materials are scrubbed from the systems. Lists of the purged materials, donated documents or transferred assets should be complied. These lists may be used by librarians to carry out purges and modify the collection development policies at a future date. A record must be kept in the system regarding the reasons for the purge, as well as of relevant statistical information and results.
13. Performance evaluation of the purge operation, quantifying results and qualifying the task itself in order to determine if the approach used was satisfactory or whether it should be modified.

Evaluation of the results of the purge

Both the procedure and the results of the purge should be evaluated so that corrective or preventive measures can be implemented in futures actions. In terms of finding the best time of year and the most able personnel for making the decisions required in the purge task, evaluation of the procedure is key to optimizing the process in the future.

The evaluation of results will yield important data for taking subsequent action, including information needed to optimize selection and acquisition policies, setting deterioration-repair rates, organizing preservation campaigns, determining collection mobility, delineating promotion and/or dissemination plans for parts of the collection, setting the cost of the purge and many other actions. Moreover, this analysis will serve to evaluate the collection in terms of least and most used sectors, detection of lacuna and determination of growth rate, etc.

Data collection and the application of quantitative indicators is an objective method for evaluating the results of the purge operation. It is also important to make a qualitative assessment of the collection that survives the purge.

Indicators

The indicators are a numerical, verbal or symbolic expression used to measure and evaluate the quality of products, services or processes. The typologies of the indicators depend on the data gathering technique; in general terms they may be both qualitative and quantitative; even though they may be classified in accord with other criteria, such as entry indicators, egress indicators, and indicators of efficiency, efficacy, performance, and impact, etc. Moreover, they serve to assess to what degree objectives are achieved. In accord with ISO 11620, we list the criteria to be used for testing or developing an indicator:

> When testing a performance indicator, the following criteria shall be used:
> a) Informative content. The content of the indicator must convey clarifying information in order to be a useful instrument for measuring an activity, identifying achievements attained, and locating problems and deficiencies and, consequently,

implement remedies. It should provide information to support decisions making, such as setting or allocating budgets, setting priorities with regard to services and activities, etc.
b) Reliability. A performance indicator must be reliable, producing the same result when used repeatedly under the same conditions.
NOTE: The fact that an indicator reflects implicit variability of the data, such as seasonal variations or fluctuation in lending activity, does not mean the indicator is unreliable.
c) Validity. The indicator must be valid, genuinely measuring what it purports to measure.
NOTE: The fact that some indicators are indirect indicators, does not mean they are invalid.
d) Suitability. The indicator must be matched to the stated objective. The units and scale must be suitable and the operations needed to implement the measuring process must be compatible with the habitual procedures of the library and its installations, etc.
e) Practicality. The indicator must be practical, in the sense that it relies on data that is reasonably accessible in terms of time, the capacity of personnel, operational costs and the forbearance of users who may be inconvenienced. If the indicator is used to compare libraries, the following criterion (f) must be applied.
f) Comparability. A library performance indicator allows comparison of libraries when the same result, after adjusting for measurement error, means that the level of quality of the services or efficiency of the libraries compared is the same (See also 5.3.5).
NOTES:
1) It is important to ensure that all activities measured are comparable.
2) This criterion is sufficient for ranking libraries in accord with the result of the performance indicator, but it is not sufficient for determining, for example, that a library earning twice the score is twice as good as another.

To ensure the efficiency of data collection and that data are collected in a timely way, the indicators shall be established beforehand, determining the object sought by each one. The following are some proposal for applicable indicators:

- *Name of indicator:* Elimination percentage
  Objective: To know the percentage of materials discarded versus the entire collection.
  Scope: This indicator can be applied to the totality of the discarded documents and can also discriminate between the document type, support, subject areas, etc.

Definition of the indicator: Once the purge is concluded a list of the entire collection is compiled.
Method: The calculation to be made is as follows: (B*100)/A, where:
A = the total material discarded, and
B = total collection.
Interpretation and factors that affect the indicator: A high purge percentage may indicate the existence of a collection that is not matched to the type of library. This may have come about because of several reasons, including the existence of very old and deteriorated materials and lack of proper promotion of the collection. Sometimes an area of knowledge falls into disuse for one reason or another; for example, when there are changes in the curricula offered in a university or school that depend on a library. It may also indicate that the purge was not performed with the proper care or that it was done by unqualified persons. In this case, the objectives of the purge become very important, because they go hand in hand with the type and volume of purge desired.
Data sources: Results of the purge and size of the collection.
Associated indicators: Size of the collection and volumes per user.

- *Name of indicator:* Ratio of entries to discards.
Objective: To measure the relationship between the documents coming into the collection and those discarded.
Scope: This indicator accounts for the materials entering in the years, or since the last purge, and the material discarded.
Definition of indicator: It is calculated after the conclusion of the procedure. It may refer to each type of material or to the totality of materials and supports included in the discard.
Method: A-B, where:
A = the total of materials entering the collection since the last discard, and
B = the total of materials discarded.
Interpretation and factors that affect the indicator: Once again the objectives of the policy must be in alignment with results yielded by this indicator. In any case, a positive number, that is, more entries than discards, indicates an increase in the volume and the quality of information of the collection. In contrast, a negative number, i.e., more discards than acquisitions, may indicate quantitative impoverishment of the collection.

Data sources: Record of inventories and results of the purge.
Associated indicators: Collection growth index.

- *Name of indicator:* Time elapsed in the process of document discard.
  Objective: To assess the degree of efficiency of the complete discard procedure.
  Scope: This may be applied to any type of library.
  Definition of the indicator: The number of days from the beginning of the procedure to its conclusion.
  Method:
  1. The user of the indicator shall set a period of time used for the measurement (for example, one month), and shall collect data on the books considered for discard and shall keep a log using the library's data systems or a record slip that is affixed to the book as it moves through the process.
  2. For each title, the user records the exact date for each stage of the process:
     a) evaluation of physical condition;
     b) verification of use frequency;
     c) evaluation of relevance of content;
     d) evaluation of author prestige;
     e) evaluation of change to alternate support, etc.
  3. For each title, the librarian calculates the number of days between the beginning of the analysis process and the final decision regarding the document. These titles are then ranked as per the number of days elapsed. The median technical processing time is the number days needed to process the title. This value stands at the middle point of the distributed ranking.
     Note: Documents that have not been fully processed are not included in the calculation, because a final date cannot be assigned to an incomplete process.
     If the number of titles is an even number, the median processing time of the purge shall be A+B / 2, where A and B are the two values standing at the mid-point of the distributed ranking. This value is rounded to the nearest whole number of days, as warranted. The median time of each stage of the process can be calculated in the same way.

  Interpretation and factors that affect the indicator: The indicator is a whole number without an upper cap. When all data from all stages of the process are gathered, the indicator may suggest the process has

taken too long or that there were delays caused by work backups or excess workload. Management decisions regarding, for example, allocation of human resources may be taken on the basis of these results.
Associated indicators: Cost of purge, Cost per title discarded.
Source: This indicator is developed on the basis of the "Median time of document processing" under ISO 11620.

- *Name of indicator:* Cost per volume discarded.
  Objective: To assess the cost of the purge procedure.
  Scope: The indicator may be applied to diverse types of documents.
  Definition of the indicator: The cost analysis for the discard of a document and its logical and coherent correction in the catalogue.
  Method: The user of this indicator shall determine the measurement period. The data shall be gathered during the sample period.
  The cost per title purged is (A x B) / C, where:
  A = the total number of hours during the sample period devoted to performing the discard procedure and analysis;
  B = the cost per hour of work (salaries and social security during the sample period, divided by the work schedule of the personnel involved, conventionally understood as being on site), and
  C = the number of titles purged during the sample period.
  Note: Buildings, operations, etc. are specifically excluded in the calculation of this indicator.
  Interpretation and factors that affect the indicator: The costs can be valued in relation to the expected quality of the collection after the purge and the time employed with regard to the expected benefit.
  Source: This indicator has been developed on the basis of the indicator "Cost per title catalogued" under ISO 11620.

- *Name of indicator:* Cost of discard.
  Objective: To assess the investment made versus expected benefits.
  Scope: This may be applied to any discard procedure in any type of library.
  Definition of indicator: The total cost of the procedure is calculated, in view of the cost per title purged plus the investment made, such as purchases of proper furnishings, construction, purchase or rent of a building for storage, library supplies, cost of printing forms, purchase of packing materials for internal and external storage, shipping costs of materials to be donated, etc.

Method: The calculation to be made is as follows: (A x B) + C, where
A= the number for the volume purged;
B = the cost per volume purged, and
C = the total outlay made.
Interpretation and factors that affect the indicator: The cost is higher when investment is higher, which must be valued in terms of the expected benefits. To erect a building to store materials can greatly increase the cost of the purge, but the additional space may also bring considerable benefits to users and the library itself, which would then have room to devote to study cubicles, grow the collection and install new equipment. The cost is prorated over the course of subsequent purges.

To apply the suggested indicators, the following data must be considered:

- Number of damaged works
- Number of lost works
- Number of obsolete works
- Number of replaced works
- Number work moved to alternative support
- Number work held in deposit (static)
- Number of swapped works
- Number of works derived from other libraries
- Number of destroyed works
- Number of works sold off
- Number of work repaired in-house or by third party

Most of these data can be recorded in the purge form already shown, which can be modified to the needs and objective of each library. Other data shall be collected on the discard task and control of the same.

The qualitative evaluation of the complete purge process may be performed by the personnel involved by means of the questionnaire or in a meeting of personnel in which participants express the positive and negative aspects of the process and suggest changes to the methodology. An additional assessment arising from the use of the collection may be performed by means of analyzing the turnover rate of the materials and the quality of the available collection, among other aspects.

Conclusion

The discard activity requires technical, intellectual and operational expertise and serves to help libraries optimize space and preserve collections, whereby user needs are better served. The task should be carefully planned in accord with clear guidelines expressed in a discard policy, which must be a part of the overall collection development policy adopted by the institution.

The successful performance of a discard operation requires duly trained personnel, a pre-planned site for receiving the discarded material and evaluation procedures for both the actions and the final results. If the planning and development are not properly executed, the purge process could yield poor results to the detriment of the institution's prestige. To ensure its orderly progress, the discard activity must be supported by a detailed procedural manual and the use of careful record keeping so that qualitative and quantitative indicators can be duly developed with regard to results.

The literature cited herein points out on numerous occasions just how controversial a book purge can be, in large part because it may seem to contradict the library's historical mission of safeguarding and preserving works of knowledge (Romero, 1985: 94). According to Romero, this is a psychological barrier among librarians who find it difficult to discard even never-used work. Moreover, discard processes often unveil errors in acquisition selection (Vall Casas, 2006: 2). If one evades the need to discard, the library collection will be doomed to aging into obsolescence, undermining its overall ability to stay abreast of scientific progress and user demands.

The methodology proposed herein is practical and straightforward. It produces clear, detailed records of the criteria applied and the materials to be discarded. Moreover, this information produces useful indicators and a record of the documents donated to other institutions.

Works Cited

Arriola Navarrete, O. (2006), *Evaluación de bibliotecas: un modelo desde la óptica de los sistemas de gestión de calidad.* Buenos Aires: Alfagrama.

Corchuelo Rodríguez, Camilo Alejandro; Barbosa Pava, Carlos Alberto, and Vargas, Ronald Alexander (2012), *Política de desarrollo de colecciones de la biblioteca de la Fundación Universitaria Los Libertadores.* Accessed February 12, 2014. http://hdl.handle.net/10760/20549

Dobra, Ana (1997), *La biblioteca popular, pública y escolar: una propuesta para su organización.* Buenos Aires: CICCUS. (Colección Praxis)

Gaudet, F., and Lieber, C. (1999), *Manual práctico de revisión de las colecciones.* 2nd. edition. París: Cercle de la Librairie.

Gaudet, F., and Lieber, C. (2000), *El expurgo en la biblioteca.* Madrid: Anabad.

Gómez Hernández, J. A. (2002), *Gestión de bibliotecas.* Murcia: DM.

Fushimi, M.; González, C.; Miguel, S.; Pené, M.; Pichini, M., and Rozemblum, C. (2011), *Evaluación de Bibliotecas Universitarias.* Buenos Aires: Alfagrama.

"Ideas para una operación de expurgo en las bibliotecas públicas" (2009), *Boletín de la Asociación Andaluza de Bibliotecarios* 24 (96/97), 187-193.

ISO (International Organization for Standardization) (1998), *ISO 11620: 1998 (e): Información y documentación. Indicadores de desempeño para bibliotecas.* España: Comité Técnico de Normalización núm. 50 de AENOR.

Melnik, D.; Pereira, M. E. (2005), *Bases para la administración de bibliotecas. Organización y servicios.* Ciudad Autónoma de Buenos Aires: Alfagrama.

Método práctico de revisión de las colecciones, adaptado del método norteamericano por Françoise Gaudet y Claudine Lieber (2011). http://www.bnjm.cu/secciones/snbp/documentacion/metodologias/descarte/descarte4.pdf

Muñoz Choclán, J. (2000), "El Plan de Expurgo de Fondos Bibliográficos de la Biblioteca Pública Provincial de Sevilla." *Boletín de la Asociación Andaluza de Bibliotecarios* 59.

Normativa de Expurgo de la Biblioteca de la Universidad de Valladolid (2006), Valladolid: Universidad de Valladolid.

Padorna, S. (2009), *Desarrollo de las colecciones y bibliotecas escolares: de la teoría a la práctica.* Ciudad Autónoma de Buenos Aires: Alfagrama.

Parejo, E. B.; Ramírez Ponferrada, M.; Sánchez Polaina, P., and Cámara Aroca, M. (2011), "Proceso de evaluación, relegación y expurgo en la Biblioteca Maimónides de la Universidad de Córdoba." *Boletín del Asociación Andaluza de Bibliotecarios* 26 (102) (July-December): 8-19.

Plan de gestión y desarrollo de la colección (2007). Accessed September 2, 2014. http://www.uma.es/publicadores/biblioteca/wwwuma/PlanGestionDesarrolloColeccion.pdf

Política de gestión de las colecciones de la Biblioteca de la Universidad Complutense de Madrid (2009), Madrid: Universidad Complutense. Accessed January 17, 2013. http://biblioteca.ucm.es/intranet/30336.php

Política General de Expurgo de la Biblioteca de Castilla - La Mancha (2012). Accessed February 12, 2014. pagina.jccm.es/biblioclm/assets/plan_expurgo.pdf

Romero, J. J. (1985), "El expurgo como labor bibliotecaria." *Boletín Anabad* XXXV (1): 93-98.

Solímine, G.; Di Domenico, G., and Pérez Pulido, M. (2010), *Gestión y planificación en bibliotecas*. Ciudad Autónoma de Buenos Aires: Alfagrama.

Vall Casas, A. (2006), "Descarte: por qué, cómo y cuándo." *bid. Textos Universitaris de Biblioteconomia i Documentació* 16.

Varela, X. A. (2000), "Programa de gestión y desarrollo de colecciones de una biblioteca universitaria (II). Política de gestión de colecciones." *Boletín de la Asociación Andaluza de Bibliotecarios* 58. http://eprints.rclis.org/5978/1/baaab58a3.pdf

Tejerina, A. O., and Villarroel, M. I. (n. d.), *Gestión de Colecciones: I-cómo hacer el expurgo en bibliotecas.* Accessed: April 20, 2012. http://www.fcm.unc.edu.ar/biblio/index.html

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Information and citizenship: a governance perspective

Héctor Alejandro Ramos Chávez *

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Abstract

The emergence and reconfiguration of a society that has greater means to access information – which in itself presents new features and contradictions – generates a need to debate the role of information in encouraging a more active and participatory citizenship in the management of public policies. This article discusses issues of democracy, citizenship participation, the public sphere, and how these are related to the information age and knowledge society in Latin America. Similarly, it reflects on other aspects of government, such as governance, which can enable wider and more active citizen participation. The article concludes that while inequality exists in the region in

* Instituto de Investigaciones Bibliotecológicas y de la Información, UNAM. aramos@iibi.unam.mx

terms of availability and access to information, governance offers promising elements to build a more informed and participatory citizenship in public affairs and public policy management.

Keywords: Information; Citizenship; Public Sphere; Public Policies; Governance.

Resumen

Información y ciudadanía, una propuesta desde la gobernanza

Héctor Alejandro Ramos-Chávez

El surgimiento y reconfiguración de una sociedad que cuenta con mayores medios para allegarse de información, la cual tiene nuevas características así como contradicciones, genera la necesidad de debatir en torno al papel de la propia información en la construcción de una ciudadanía más activa y participativa en la gestión de políticas públicas. Tomando en consideración el contexto latinoamericano, este artículo aborda esa discusión vinculándola con otros temas como la democracia, la participación ciudadana, la esfera pública, la era de la información y la sociedad del conocimiento. De igual forma, se reflexiona sobre otros enfoques de gobierno, como el de la gobernanza, que pueden permitir que esa participación sea más amplia y activa. Las conclusiones apuntan a que si bien en la región actualmente existen desigualdades en cuanto a la disponibilidad y acceso a la información, la gobernanza ofrece elementos promisorios para la construcción de una ciudadanía más informada y participativa en los asuntos públicos y en la gestión de políticas públicas.

Palabras clave: Información; Ciudadanía; Esfera pública; Políticas públicas; Gobernanza.

1. Introduction

Despite the great strides that have been taken with regard to making information available through information and communications technology, there is still a wide swath of society that does not enjoy access to the

internet, public libraries and the deep stock of specialized literature in all fields of inquiry. The implication of this uneven accessibility of information results in a segmented citizenry, within which we can find well-informed persons equipped to participate in public matters and others who are uninformed whose participation is scarce or practically non-existent.

This excluded sector of society tends to form its opinions through the mass media, largely television, which brings to the fore the issue of the quality of information "consumed." Some researchers have warned that the mass media seeking legitimacy would try to mold people's needs and otherwise make citizens conform, thereby giving rise to a stereotyped citizenship (Giglia and Winocur, 1996; Martín-Barbero, 2001; Winocur, 2002, 2003).

Any solution to these problems is not simply stated, because in a large degree it is linked to the overall conditions of social inequality prevailing in Mexico and Latin America, and the persistence of a public sphere that does not include a large portion of the population (Fleury, 2004).

Given this scenario, the need arises to reflect deeply on the vital role played by information in the makeup of the citizenry and the possibility of implementing new models for information management such as governance, which would allow inclusion of a greater number of individuals in the processes of establishing public information policies and programs.

In view of the Latin American context, specifically Mexico, this paper aims to advance the debate surrounding the importance of information in the constitution of the citizenry, while arguing that a better informed citizen will be better able to participate in the creation of better public policy. To this end, the first section herein addresses the concept of citizenship and offers some general notions and a framework of the debate as it currently stands. The second section analyzes the link between citizenry and democracy, and discusses the important role played by information in the edification of the citizen. The third section addresses the concept of citizen participation, contextualizing it in the so-called "information age" and the "knowledge society." The fourth section analyzes the governance model as an alternative form of managing public policy, while first attempting to conceptualize the term and differentiate it from governability, before moving onto a broader discussion of implications, conclusions and proposals for further research.

The concept of citizenship

While the aim of this paper is not to perform a detailed analysis of the concept of citizenship, it is important to provide a framework for grasping how the term has been used in recent literature. The notion of citizenship has been approached from diverse angles. These angles include viewing citizenship as an instrument of social control (Vieira, 1998); its association with the city and public spaces (Borja, 1998; Ramírez, 2003; Capron and Monnet, 2003; Espinosa, 2004); and its role within the State and improving democracy (O'Donnell, 1993). Other studies have focused on gender (Bolos, 2008; Molyneux, 2000; Aguirre, 2003); the circumstances of social inequality (Fleury, 2004); and on new forms of citizenship driven by immigration and globalization (Lechner, 2000).

Depending on cultural and historical contexts, the analysis of the concept of citizenship has assumed diverse forms and spurred an array of interpretations. The most basic of these approaches defines citizenship as the individual's right to enjoy rights (Vieira, 1998). The broader notion of citizenship in both meaning and constituent elements; however, is attributed to T.H. Marshall (1997), who analyzed the development of the concept in England,[1] concluding that citizenship is composed to the following three elements:

1. The civil element, referring to the rights needed to enjoy individual liberty, freedom of the person, freedom of expression, of thought and religion, including the freedom to hold property and the right to justice.
2. The political element, entailing the right to participate in the exercise of political power.
3. The social element, which is linked to the right to a minimum standard of living and the right to share in the social heritage and enjoy the benefits of civilization.

This breakdown has not been without criticism. Craston (1983) states that social rights are not natural rights and cannot, therefore, truly be embraced as universals. Because social conditions arise from the historical processes of each country, they should not be associated with the general con-

1 Originally published in 1949.

ception of citizenship. Turner (1990), in turn, criticizes the idea of the citizen as a passive entity subject to the decisions and action of State agencies. Finally, Roche (1987) asserts that Marshall's view does not acknowledge the processes of political action, such as revolutions that are the originators of our understanding of the concept of citizenship.

Despite these criticisms, Marshall's examination has helped deepen the debate surrounding citizenship and social class, which according to his view arise from contradicting principles, since citizenship is based on the idea of equal rights and duties, while inequality is the essence of the social class system. In light of these considerations, the concept of citizenship needs to go beyond formal acknowledgement of potential equality and capacity to enjoy rights. The concept must become a real principle of equality that entails social justice. To this end, a balance between the civil sphere, understood as individual rights, and the civic sphere, associated with the duties owed to the State, must be found.

Up to this point, one might identify a "historical" vision of the concept of citizenship that serves to dub the individual as a citizen, which thereby endows him with legally established rights in the jurisdiction of a given country and with such rights that are deemed universals, as declared in the 1948 *Declaration of Universal Human Rights*. The primary constituent elements of citizenship, however, are brought forth in debates occurring in the second half of the twentieth century. These discussions have led to the idea that rights are not enjoyed by individuals, but rather by human collectives, such as the community, nations, and ethnic groups, women, the elderly, children, adolescents, consumers –not to mention the environment itself as a sphere of rights. Some have gone as far as to propose a "fourth generation" of rights associated with bioethical issues of preserving rights and matters associated with genetic engineering (Vieira, 1998).

There have been diverse approaches to these matters that should be considered when attempting to understand the concept of citizenship in the world today. Several of these approaches are associated with new forms of social identification, problems with traditional political representation, the search for new channels of participation, ethnic conflicts, and globalization, etc. (Winocur, 2003). All of these issues exert and impact on the concept of citizenship.

To contextualize the sense of the concept of citizenship today, it is important address three of these approaches. The first is associated with the loss

of credibility in the representation once provided by traditional channels of citizen participation, such as political parties or unions. The second is associated with the advent of new identities and the struggle for acknowledgement; while the third is associated with the influence of the mass media in the construction of the citizen.

With regard to the first aspect, it has been argued that: "politics is no longer what it used to be. It once was a set of more or less structured institutions and procedures with deep ties to the community in the form of patronage and corporatism […] today the situation has changed" (Lechner, 2000: 25. Translated from Spanish). In this sense, one becomes aware of loss of centrality of politics and the axis that once ordered and articulated social life, and as the sphere in which citizens anchored their expectations and whose channels were used to fulfill that vision of social order. The social order supplied by this political structure has been undermined by functional changes in the economic, social and political spheres.

This process of de-legitimation of traditional channels of participation is also associated with the crisis in ideologies and representation in political parties and labor unions, which pushes the citizenry "to abandon institutional politics and toward alternative local instances centered on social and community interests of great diversity" (Winocur, 2003: 234. Translated from Spanish).

In conjunction with this approach, and perhaps in response to it, new groups with differentiated identities have sprung forth. Their need to be acknowledged comes in conjunction with demands focused on specific needs. Even though these identity-based movements are more prevalent in Europe and the United States, they have become increasingly visible in Latin America. These discussions have fueled debate on the concept of the citizen, as groups tend to argue for acknowledgement their rights to be different, while setting aside the notion of their equal rights as citizens.

These groups include feminists who argue that women have specific needs. But it is also necessary to learn about the interests, specific rights and forms of participation of indigenous peoples, migrants, senior citizens, disabled persons, young people and racial and sexual minorities. Many of these groups do not feel fully identified with the general citizenry and they seek to be taken into consideration as members of society from the standpoint of their differences. In other words, they demand recognition of

> […] their way of being in the world, their way of relating with others and nature, as expressed in the language they use, in the comprehensive doctrines they at times profess and the way in which the genders associate […] it seems they want to participate as a group, with its own identity, in a political community. (Peña, 2005: 100. Translated from Spanish)

Not limited to the generic idea of nationality, these discussions of the concept of citizenship approach matters of individual rights of persons and their ties to a specific community in terms of their identification with groups such as women, young people, senior citizens, disabled persons, etc.

The third element of the analysis addresses the influence of the mass media on the citizenry, in terms of both the meaning of citizenship and how it represents the citizen, because:

> […] the retreat of traditional public spaces, in conjunction with the omnipresence of television and radio in the home, have seriously affected the processes of public opinion, modalities of participation, the ways of belonging and the strategies of inclusion in the public sphere. (Winocur, 2003: 237)

It is important to gain an understanding of these new modalities of citizen participation, which are often imbued with media bias, and the danger entailed in a citizenry that bases its participation on consumer practices (García, 1995), rather than on a genuine interest in pursuing the good of the community.

In this regard, the mass media are key agents capable of addressing, discussing and emphasizing matters of public interest. On the other hand, these media are quite capable of suppressing, limiting and skewing information that is very relevant to the public agenda. This situation invites question regarding the ability of private mass media to present objective, transparent information to the public, without skewing it serve their commercial and corporate interests. In this sense, one researcher has argues:

> […] that the aims of commercial media –that which is expanding most rapidly in the world– is to generate controversy in the public square in the democracies, since the economic, corporate and sometimes political interests of these types of media influence the content they present, which can exert an effect on the quality of their performance when called upon to observe, inform and debate. (Guerrero, 2006: 13)

In conclusion, the discussion surrounding the communications media and traditional forms of citizen participation should not center on superimposing forms of citizen participation, but rather on complementary forms that allow for the construction of new forms and scenarios of participation (Martín-Barbero, 1999).

These elements allow one to see how the concept of citizenship can no longer be circumscribed to the legal dictum of "the right to enjoy rights." The conversation now includes many other factors that affect the forms and practice through which the idea of the citizen is posited. As such, the understanding of the concept takes one back to the analysis and appreciation of other elements that underpin the concept of citizenship.

Marshall and other researchers have asserted that citizenship can only achieve its fullest expression within a democratic State, in which civil, political and social rights are guaranteed for all members of society, who are, moreover, fully capable of participating in public affairs. In this regard, the question of the relationship between the citizenry and the democracy becomes relevant, because as already mentioned citizenship depends on the existence of a democratic government committed to consolidating the citizenry, while accepting the need for an independent citizenry that is sufficiently participative to ensure the democratic experiment. These elements, including the essential role of information in the construction of the citizen, shall be analyzed in the following section.

Democracy, information and citizenship

The debate surrounding governability in democracies and institutional redesign has become hung up on question of the limits of representative democracy.[2] In this sense, many have argued that to achieve broad social consensus there must be a strong link between representative democracy and participative democracy[3] that is capable building efficient public policies to serve the needs of society in the best way possible.

2 Also known as delegative, passive or low intensity democracy.

3 In contrast to the idea of representative democracy in which one might speak of a population or civil society playing the rather limited role of legitimizer or censure of government actions through the ballot box, the participative model of democracy whose active, deliberative dynamics feature the concept of an informed citizen who proactively posits arguments in the public arena.

Latin America may well be considered one of the world's most unequal regions. As such, the matter of exclusion of a large portion of the region's inhabitants becomes very relevant. This exclusion may be based on economic, political and cultural factors that touch participation; but it is also clear that all of these factors are influenced by the degree of access to information the inhabitants enjoy. Some researchers have characterized the matter of inequality of information access through new information and communications technologies as the "digital gap"[4] (Hoffman, Novak and Schlosser, 2001; Castells, 2001; Servon, 2002; Rodríguez, 2006, among others). All of these elements erect barriers that restrict access to public affairs.

Owing to the growing importance of the concept of the *public sphere* with regard to matters of citizenship and democracy, it is worthwhile to take time to reflect on this idea, which of course stands in opposition to the *private sphere* of the home and family. The public sphere includes those things that can be seen and heard by everyone, i.e., "the public sphere, like the world in common, brings us together and nonetheless keeps us from stumbling over each other, so to speak" (Arendt, 1993: 62. Translated from Spanish). The work of Arendt (1993) posits three basic activities of humanity on Earth: the first is "Labor," associated with those tasks needed to maintain life, such as securing food and water, sleeping and resting; the second is "Work," which entails the use of materials offered up by nature to "manufacture the interminable variety of things that comprise the human artifice" (Arendt, 1993: 165. Translated from Spanish); and thirdly, the sphere of "Action," which imbues the individual with a sense of liberty and distinguishes humanity from nature. Through such action "with word and deeds we insert ourselves in the human world" (Arendt, 1993: 206. Translated from Spanish), thereby imbuing the public sphere with meaning, since this allows two essential factors for understanding the concept of citizenship to stand out in relief:

1) The possibility that all individuals may be seen and heard, and
2) The creation of a common space in which individuals reveal themselves through argument, discourse and action.

These approaches share some points with the theory of communicative action posited by Habermas (1987), which analyzes the public sphere from an understanding of society as a "system" and a "lifeworld." In terms of the

4 This concept refers to the inequality in terms of availability and use of technologies, such as the computer, internet connection and mobile telephony, etc.

"system," Habermas stated that they are fields based on instrumental reason and associated with the State and the economy that, as capitalism evolved and modernized, wound up colonizing and dominating the "life world," which is the sphere of culture, personality and society that provide the grounding for communicative reason. This is where language and especially dialogue play key roles in the creation of consensus among individuals. In this respect Habermas states:

> […] the systemic mechanisms wind up displacing the earlier forms of social integration, including those contexts in which the coordination of action in terms of consensus have no replacement whatsoever; that is, even where what is in play is the symbolic representation of the lifeworld. Thus, the mediatization of the lifeworld adopts the form of colonization of the lifeworld. (Habermas, 1987: 276. Translated from Spanish)

Before this scenario, through the use of discourse, participation and dialogue to promote communicative action, a "reversal" of this process of colonization has been proposed. In this way, change may be possible in which:

> […] a self-regulating system, in which all events or states can be attributed a meaning by virtue of functional position, is substituted gradually by a model structured on communications theory, in which agents direct their actions as per their own interpretations of the situation. (Habermas, 1987: 168. Translated from Spanish)

In this way, Habermas understands the public sphere as directly associated with the "lifeworld" and as a place where collective decisions are made, which thereby legitimizes the democracy. Nonetheless, Habermas is aware of some problems inherent in this ideal democratic process, which seems to take into account only the virtues of current citizens, a situation that assumes all persons are equally possessed of sufficient, rightly assimilated information to ground their discourses and opinions. In regard to this issue, Marshall states that "the right to free speech has little substance. Because of lack of education, you may have nothing to say worth hearing. You are also without the media resources needed to be heard in the event you wish to say something" (1997: 316. Translated from Spanish). This situation is directly linked to the topic of information, understood as a right and in its role in making the right to free speech something real.

In the context of democracy, one may understand information as an essential element through which citizens can increase their knowledge and

thereby their capacity to take action in public affairs. Information, as such, is like a pillar in the edifice of the public hall. In the current scenario, however, we find that marginalized groups, the poor and vulnerable, are very often deprived of important, timely information to help them enjoy a better way of life. They are also quite often unaware of their rights, employment options, public health services, housing opportunities, educational options and general public policy. This is because these groups rarely participate in setting the agenda, defining strategies and allocating public funds, which are the essential functions of the public sphere.

In this sense, Fleury (2004: 142. Translated from Spanish) argues that "the construction of democracy in the region introduces the vindication of the citizenry's fifth generation right, which goes beyond civil, political, social and diffused rights, to demand a deliberative role in the creation of public policies." At this point, it is also necessary to implement actions to ensure those previously without access are provided access to information so they can aspire to better tools for participating in general public affairs and setting public policy.

Information can be understood as a right and a basic principle of democracy. As a right, great strides have been taken internationally to acknowledge the right to expression and access to information, which are fundamentally aimed at rooting democratic principles such as participation, responsibility, accountability and general transparency. As a basic principle, access to information can be understood as a fundamental instrument for increasing and improving the capacity for action of the population; because it provides the foundation for the edifice of general democratic processes and participation in the public sphere and creation of public policies.

While protection of the right to information access is fundamental (access understood as the capacity to approach information clearly, openly and opportunely), it is also important to improve information flows among the diverse agents, such as government, associations, civic organizations, interests groups and the private sector. Before this scenario, it becomes essential to create and reinforce the mechanisms and policies that allow communication and exchange of information among these agents.

Several international organizations have issued recommendations to improve the situation in these matters. Programa de las Naciones Unidas para el Desarrollo (2003) recommends focusing largely on four areas:

- Strengthening the legal framework that regulates and ensures information liberty and pluralism.
- Supporting and strengthening emerging networks and communications media at both the local and national level in order to facilitate plural, independent exchange of information.
- Expanding awareness of the right to access to official information and improving information supply channels.
- Generating and improving the mechanisms of communications needed by the less favored population in order to participate in policy formulation at the local and national levels.

As a right, access to information has been included in Article 19 of *Declaration of Universal Human Rights,* which states: "Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers." Moreover, Article 6 of the *Political Constitution of the United Mexican States* states (translated from Spanish): "The expression of ideas shall not be the object of any judicial or administrative inquisition […] the right to information shall be guaranteed by the State"; and moreover, "All persons have the right to free access to plural and timely information, and to seek, receive and spread information and ideas of any kind and by any means of expression."

As can be seen, both of these articles address the right to information, its communication and the expression of ideas. Therefore, individuals can be users, conductors and producers of information. In this light, we can see that information access cannot be approached merely as a question of protecting information rights; the use and communication of information must also be promoted and protected. In this way, the expression of ideas and genuine participation of individuals in political processes and public affairs will be ensured.

The aforementioned factors give rise to the need to rebuild the public sphere within a democratic context that encourages ever broader participation. To this end, new organization, negotiation and concertation patterns must be found. This process will also require improved channels for accessing relevant and timely information. Such changes will help society get beyond optimistic slogans that tout citizen participation as an essential element for improving the social situation; and they will help reverse the trend that sees citizens exerting little or no influence in public policy. The citizen's scant participation in public affairs is the result of the generally precarious-

ness living conditions of large parts of the population who lack fundamental social resources needed to exercise participatory rights in a meaningful way. (Canto, 2008). In this light, the question of citizen participation within the knowledge society will be addressed in the following section.

Citizen participation in the knowledge society

There are differences between the concept of the citizen who by prerogative enjoys rights and the citizen who actively gathers information, intervenes and participates in public affairs. In order to contextualize it within the information age and the knowledge society, the question of citizen participation deserves closer examination, especially in light of rapid technological advances in the fields of information and communications.

The concept of citizen participation has been addressed from many standpoints, which has led to diverse meanings and some difficulty in arriving at a generally accepted notion of the concept. Nonetheless, these approaches have enriched the debate surrounding the idea of citizen participation. In general terms, citizen participation can be understood as the intervention and influence of individuals in public affairs on the basis of their status as citizens and members of a given social or political community. As such, it is the social process resulting from intentional action of both individuals and groups pursuing a specific goal as a function of their interests, and social and power relationships (Velásquez and González, 2003).

Citizen participation can vary within different types of governments, the degree of democracy, institutional factors, a given society's organizational abilities and in general as a function of the relationships in place between society and government. Several researchers have stressed the importance of the relationship between society and government, picturing it as a process of interaction, communication and even differentiation that they actively pursue (Espinosa, 2004). These diverse manners of participation also influence the type of democracy and whether it flourishes of fails in the long term. The permanent link between democracy and citizen participation is stressed by O'Donnell:

> […] as a form of effective politics in a given territory, democracy is necessarily linked to the citizenry, and a true citizenry exists only within the legitimate demo-

> cratic State. The universalization of citizenship is an ideal that only genuine, existing democracies, in greater or lesser degree, can rightly entertain. (1993: 74. Translated from Spanish)

Changes in the governments of the region and in our own country have pointed toward more democratic forms of participation, allowing new associative models to flourish and, as if to underline the importance of citizen participation in the consolidation of democracy, a renewal of the uses of public spaces.

Once the citizenry genuinely exercises their political rights; however, it is important to encourage additional citizen participation in other public affairs and initiatives (Prats y Catalá, 1996; Giddens, 2000; Fleury, 2004). In this way, a new kind of institutional order that is open and plural can be produced (Calderón, 1995).

Citizen participation comes in two basic flavors: the institutional and the autonomous. Institutionalized participation moves through the regulatory statutes of the legal framework and can lend legitimacy to the government, while promoting democratic culture, more effective decision making and generally improved public administration. The autonomous flavor, in turn, arises from the civil society outside of the strictures of government agencies (Ziccardi, 1998).

Moreover, participation can be configured as administrative or political. Administrative participation is depoliticized, in that it does not lead to changes in social power structures, but rather consists of a rational instrumentality that directly serves the participating parties interests. In contrast, the goal of politicized citizen participation is to exert influence in the balances of broader social power, and it is this type of participation that will receive the most attention herein, because it requires more information in order to properly frame rational arguments (Cunill, 2008).

In this regard, the concept and role of citizen participation needs to be understood within the so-called "information age" and ensuing knowledge society.[5]

5 Along these same lines, Clark (1997) states that the knowledge society may be deemed a later stage of the civilization called the information age.

The advent of the information age is inseparable from the revolution in information and communications technologies,[6] which has exerted immeasurable impacts on the economic, social and cultural functions of nations and their interactions (Castells, 1999). Castells takes care to distinguish development based on information from that associated with agricultural and industry, when he stresses: "in the new model of information development, the source of productivity lies in knowledge producing technology, information processing and the communication of symbols" (1999: 42-43. Translated from Spanish). In the information age, therefore, we find:

> […] that indicators of technological growth in the informatics and communications sector and its impact on the socio-national structures and deepening of the density of social relationships derived thereof reveal that a scenario hardly predictable in terms of the likely developments several decades ago is in fact here. (Bernal-Meza and Masera, 2007: 92. Translated from Spanish)

For these reasons, we can associate the information era with a development that directly impacts society. This development considerably expands the power of individuals instantly to gather, produce and share information in many forms from practically any place. It is important to keep in mind, however, that with the use of this concept "a new paradigm is posited, whose ordering principles reveal a route toward an emerging society under construction that is a product of the action of technological systems and advances in digitization processes" (Bernal-Meza and Masera, 2007: 94). This emerging society is currently being referred to by many researchers as the *knowledge society*.

Sakaiya (1995) extended the reach of the concept of the knowledge society when he stated that, apart from material satisfactions, societies would lend greater import to immaterial questions such as knowledge, and this knowledge would constitute one of the great building blocks of nations. This constituted a break from the earlier notion of development based on industrialization and growth of capital.

Drucker (1974) was one of the first researchers to cite the term knowledge society, arguing that the strength of the economy was moving away from the utilization of finance capital and natural resources, and giving way

6 In the view of Castells (1999: 32), these new technologies are associated with "the emerging set of micro-electronics, informatics (machines and software), telecommunications/television/radio and optical electronics" in addition to "genetic engineering and the growing set of developments and applications."

to economic growth based on knowledge. Moreover, Drucker envisioned a future in which leadership was held by those with solid knowledge, what he called "knowledge professionals," while those with financial resources would be pushed to the background. Another current of thought (Hansson, 2002) points out that we already live in a knowledge society, marked by development and technological advances that have driven great growth of knowledge. More importantly, these viewpoints agree that matters of wealth, well-being and people's happiness can no longer be gauged in terms of productivity and merchandise, but must also be assessed as a function of the knowledge an individual possesses.

As it relates to globalization, information technologies emerging with the knowledge society can serve to improve the operations of business and general economic activity, while also enhancing interactions that take place between citizens and these entities. By virtue of this valuation of knowledge, the role of the citizen can stand out as the main competitive asset, beyond any simple analysis of the citizen as a human resource.

With regard to this matter, the concepts of the knowledge society and the information age have been used as if they were synonyms referring to the same thing. Each term, however, stresses specific aspects of analysis. While the term information era refers to the great expansion of information driven by information and communications technologies, such as the internet; knowledge society stresses the understanding possessed by individuals as a factor of development and wealth. The first term refers to the enormous availability of information and data, while the second is suggestive of genuinely assimilating such information and putting it to good use. This distinction is not a small matter, as pointed out by Ríos (2014: 148), who asserts: "a change in how information and knowledge are perceived in vital for understanding the paradigm shift in social development"; therefore, these concepts must not be conflated, because "the birth of the information society based on a technological revolution is merely an instrument for achieving a model of the knowledge society" (Ríos, 2014: 149. Translated from Spanish).

The debate surrounding the concepts of information age and knowledge society can be very useful when examining the concept of the citizen and citizen participation. As this is related to the internal dynamics of society itself, many studies, in fact, suggest that information and knowledge are key variables in questions regarding exploitation of natural resources, economic policy, and the production and distribution of power in modern societies (Web-

ster, 1995; Thurow, 1996). Toffler (1990) states that in contrast to natural and economic resources, knowledge does not spend, but rather tends to accrue. As stated before, however, the proper production of knowledge and information requires a democratic context in which liberty is the primary value, allowing ideas to flourish and citizens to secure the information they need. In this light, Toffler's (1990) optimism regarding the democratization of the distribution of knowledge may be deemed naïve, as he foresaw even the poor and weak having the capacity to acquire information. Today we understand, however, that, unlike Toffler's vision, access to information and associated costs continue to pose obstacles (Morales, 1990).

Once the concepts of information, citizenship, and the information age and knowledge society have been duly examined, an analysis of the problem of the low levels of citizen participation in the public policy agenda of the region can be undertaken. This problem is complicated by the fact that many of the factors discussed can be understood as both cause and effect; that is, on one hand the citizen needs information to exercise advocacy and exert positive influence in public affairs; while on the other better public policies are needed to ensure that the citizen can enjoy such access to the required information and thereby improve the quality of participative advocacy. The way out of this "catch-22" proposed herein entails the adoption of a governance model for setting and managing public policy. This model will be described in the following section.

The governance model for setting and managing public policy

It has been said that "public policy is made of words" (Majone, 1997: 2. Translated from Spanish). In this sense, whether oral or written, argumentation is basic to the process of drafting and managing policy, especially in the context of democratic governments that allow diverse agents to exercise advocacy while attempting to build consensus for concrete action. An ideal model of policy management within a democratic State would entail expression of ideas needs and concerns about shared issues. These matters would be taken up by candidates to elective office, who would propose projects and plans to address the concerns gathered in the earlier stage, allowing the voters to choose the candidate they believe will bring genuine solutions to their problems. The candidate's proposals are then implemented as public policy by the executive (Majone, 1997).

This ideal is a far cry from reality, because of the persistence of unequal access to and distribution of the kind of information required for participation through effective argumentation. This problem has two main vertices: on one hand there are groups that control and amass most of the information, both in terms of quality and quantity. These groups tend to exert influence in the setting and delivery of public policy and general administration of public affairs; while, on the other hand; broad swaths of society participate in public affairs hardly at all. This imbalance reveals just how inadequate information needs are being met, something that puts the brakes on "the expansion of the knowledge possessed by individuals and […] the intellectual development of people striving for a better station in life" (Ramírez, 2013: XV. Translated from Spanish). Consequently, it is important to consider new government models that provide for the creation of mechanisms that facilitate better distribution of information and thereby broader citizen participation in public affairs.

In this sense, the governance model, in contrast to the governability model, seems to have quite a lot to offer. Though the aims of this paper do not include a detailed discussion of the difference between the two, it may be useful to contrast several analytic perspectives in order to better grasp the concept of governance.

In the firsts place, the concept of governability moves forward in the face of the increasingly pugnacious nature of social demands by opening the public policy agenda. This model was a central feature of the government apparatuses of many countries in the 1970s (Crozier, Hungtinton and Watanuki, 1975). Moreover, the principles of the governability approach came in direct response to the need to confront repeated financial crises and economic downturns. In addition to this, the governability model served to underpin the legitimacy of the government in terms of public sector efficiency and effectiveness.

As the social welfare States began to buckle and wobble, governability began to take on a meaning to describe a government's capacity to address new challenges and social demands as these arose. In this sense, governability describes the government's capacity to set, deliver and administer public policy. Good government of this kind, in conjunction with the expansion of citizens' rights and opportunities, has lessened the risk of a return of authoritarian government, which provides additional grounds of stability for consolidation of the democratic experiment (O'Donnell, 1979; Przeworski and Wallerstein, 1988).

The concept of governability, however, has recently undergone some review as it is contrasted with its opposite, i.e., ingovernability (Coppedge, 1996), which occurs when a State is overburdened economically and cannot meaningfully address social demands. This ingovernability is also apparent in the failure to control the expansion of social services rationally and in balance with market interests (Pasquino, 2005; Mayntz, 2000). In this sense, several researchers have asserted that governability is nothing more than the conservative ideology of the crisis (Offe, 1979).

On the other hand, the concept of governance (Aguilar, 2006; Kauffman, Kraay and Zoido-Labaton, 2000; Peters, 1998; Brugué, Gomà and Subirats, 2005; Torres and Ramos, 2008, 2012; Mayntz, 2000, 2002; Scharpf, 2000, 2001; Camou, 2000; among others) has been used in several approaches, most of which converge on it as an idea entailing the performance of public processes and policy decisions through delegation of decision making faculties to a plurality of stakeholders. This model also embraces the use of mixed private and public sector approaches in order achieve horizontal consensus. The governance model seeks to achieve consensus by diminishing hierarchal distinction and the overbearing role of the State that might otherwise presume to be the only party qualified to set public policy (Torres and Ramos, 2008).

Mayntz (2000) emphasizes two new elements in the definition of governance. The first approach views it as "a new style of government distinct from the model characterized by hierarchal control, which embraces greater cooperation among stakeholders and genuine interaction with the State and non-governmental agencies within the decision-making matrix comprised of both private and public spheres" (Mayntz, 2000: 1. Translated from Spanish). The second approach sees governance as "a distinctive model for coordinating individual actions, understood as primary forms in the construction of social order" (Mayntz, 2000: 1. Translated from Spanish). With this kind of participative action, the government can work beyond its traditional limits by exploiting public participation networks and processes with the aim of enhancing its capacity to understand and anticipate problems, intervene opportunely, while optimizing actions; something that could allow it to move out of crisis management mode (Bourgon, 2010).

The matter of governance was discussed in the critical literature throughout 1970s and 1980s, where it is presented as a decentralizing trend that ex-

ploits horizontal networks comprised of public and private agencies.[7] This line of thinking provided the basis for viewing hierarchies with some disdain, while governance became the process of construction of horizontal consensus. This led to the view that institutions could be understood as horizontal decision-making networks, something that necessarily questioned the viability of centralized institutions and governmental agencies.

Under the influence of postmodern theory in the 1990s, a paradigm featuring decentralization began to take shape. One aim of this paradigm is to allow government of exploit the benefits of social networks by empowerment of stakeholders, implementation of public policy networks and promoting a culture of accountability (Peters, 1998). This trend pointed to a restructuring of the functions traditionally entrusted exclusively to the political-administrative apparatus of the State and embracing a political life featuring negotiation between public and private sector stakeholders. Several researchers have suggested that this process in fact began to blur the line between the public and private spheres (Börzel, 1998; Kenis, and Schneider, 1991; Kohler-Koch, 1996).

The following is a summary of the salient features of a model of governance:

- Ground-up construction of coordinating processes for the organizations and agencies of government.
- Clarification of proposals submitted by stakeholders advocating the implementation of public policy.
- Agreements between public, private and social sectors that include performance indicators.
- Decentralized administration and oversight.
- Culture of transparency and accountability.
- Lower transaction costs that can be measured by the degree of trust and reciprocity in the facilitation of innovations on any given spatial scale.

The central features of governance are coordination and articulation among the stakeholders within geographically defined regions with shared

7 The term "partnership" has been used to refer to broad-based, participative initiatives involving diverse stakeholders, who employ dialogue and discourse to reach consensus and exert impact on policy, programs and actions. In this ways the parties subject to government actions take an active role in determining these actions.

social and cultural interests. In this context, in order to improve information policies, it would be necessary to involve and coordinate such agents as international agencies, public decision makers (municipal, state and federal), NGOs; information producers, broadcasters and suppliers; information users; heads of media departments, library personnel, library and information science specialists as well as many other stakeholders. In this light, governance

> […] promotes the construction and consolidation of networks, solidary exchange and associations, and is also a kind of social capital arising from the exchanges and rules built from the bottom up and the coordination of institutions from the top down, something that also serves to enhance the positive capacities of citizens. (Torres and Ramos, 2012: 104. Translated from Spanish)

Setting and implementation of public policy through a governance model would also entail the implementation of a system of formal and informal rules to set the parameters for interaction and exchanges between the public and private spheres. Accountability rules would also serve to ensure plurality of participation of stakeholders with diverse public, social and economic interests. An approach such as this can also lend greater legitimacy to government action (Aguilar, 2006; Pierre and Peters, 2000; Williamson, 1979, 1994; Mayntz, 2002; McCarney, Halfani and Rodríguez, 1998), while providing enhanced availability of and access to information that is relevant for citizens wishing to advocate in the public arena.

Final reflections

One of the objectives of this paper is to address the changes to the concept of citizenry as it moves from merely the idea of the individual, upon whom rights are deposited, to a multifaceted concept, in which individuals are actively engaged in matters of public policy. This shift is associated with democratic transformations, which argue that in order to improve democracy one must move from representative democracy, which relies on the election of representatives to public office, to a more active kind of democracy in which citizens are engaged in public affairs permanently.

For this participation to have solid grounding, citizens require information to make successful forays into the public arena founded on the quality of argument and clarity of ideas. In this sense, information is an essential element in the constitution of a more engaged, participative citizen. Nonetheless, in Latin America inequalities persist in matters of access to and use

of information, affecting, of course, the quality of any given citizen's participation. In this way the elites who enjoy the most and best quality information are able to participate very effectively in the public policy agenda, while a broad swath of persons, unaware of their rights, do not participate meaningfully to improve their quality of life.

A governance model could go a long way to countering this situation, even in view of the complexity of the problems with information access and distribution. The strength of the governance model resides in the value it affords plurality, while ensuring a greater degree of cooperative decision making. In this model, the government is no longer the only agent capable of making decisions. Its role shifts to one of coordinator of the stakeholders who participate in the setting and delivery of public policies.

Consequently, from the standpoint posited herein, governance constitutes an element of integration of citizens with the activities of the State, especially with regard to public policy. In this way it can create unexpected, positive synergies, while fomenting the citizens' capacity to participate and improvement of information access, distribution channels and the production of information itself. Along these same lines, governance can foster the flow of information and knowledge, because it is a horizontal model of government and decision making, in which the diverse stakeholders participate in the decisions and the assessment of results. As such, it promises to be highly transparent modality of public administration.

These reflections invite several lines of inquiry with the potential of enriching the debate surrounding the nature of governance in the democratic society. These questions include: What changes have been made in the law with regard to access to public information and how have these changes impacted citizen participation? What is the role of public libraries in the formation of citizens? Are there any examples of governance at the state or municipal levels? Finally, it seems pertinent to ask: What other government or social incentives might exert a positive impact on the creation of model with the features of governance?

Works Cited

Aguilar, L. (2006), *Gobernanza y gestión pública.* México: Fondo de Cultura Económica.

Aguirre, R. (2003), *Género, Ciudadanía social y trabajo.* Montevideo: Universidad de la República.

Arendt, H. (1993), *La condición humana*. Barcelona: Paidós.

Bernal-Meza, R., and Masera, G. (2007), "Sociedad de la información: etapa posterior de la globalización/mundalización. Desafíos y riesgos para América Latina." *Realidad Económica* 227 (April-May): 90-116.

Bolos, S., comp. (2008), *Mujeres y Espacio Público: construcción y ejercicio de la ciudadanía.* México: Universidad Iberoamericana, Instituto Nacional de las Mujeres.

Borja, J. (1998), "Ciudadanía y espacio público." *Revista Ambiente y Desarrollo* XIV (3): 13-22. Bogotá: PUJ.

Börzel, T. (1998), "Le reti di attori pubblici e privati nella regolazione europea." *Stato e Mercato* 54: 389-431.

Bourgon, J. (2010), "Propósito público, autoridad gubernamental y poder colectivo." *Revista del CLAD Reforma y Democracia*, 46, 1-23.

Brugué, Q.; Gomà, R., and Subirats, J. (2005), "Gobernar ciudades y territorios en la sociedad de redes." *Revista Reforma y Democracia,* Centro Latinoamericano de Administración para el Desarrollo (CLAD), 32 (June): 5-18.

Calderón, F. (1995), *Sociedad sin atajos.* Buenos Aires: Paidós.

Camou, A. (2000), "La múltiple (in) gobernabilidad: elementos para un análisis conceptual." *Revista Mexicana de Sociología* 62 (4) (October-December): 159-188.

Canto, M. (2008), "Participación ciudadana: la gobernanza de las sociedades complejas." *Revista Política y Cultura* 30: 1-25.

Capron, G., and Monnet, J. (2003), "Una retórica progresista para un urbanismo conservador: la protección de los centros históricos en América Latina." In *Espacio público y reconstrucción de ciudadanía*, compiled by P. Ramírez, 105-136. México: Miguel Ángel Porrúa, FLACSO.

Castells, M. (1999), *La era de la información. Economía sociedad y cultura, I La sociedad red.* México: Siglo XXI Editores.

—— (2001), *La Galaxia Internet.* Barcelona: Plaza & Janés.

Clark, I. (1997), *Acerca de la información como fetiche, ¿Sociedad del conocimiento?* Accessed February 13, 2013. http://www.parquechasweb.com.ar/parquechas/notas/Nota_soconocimiento270607.htm

Coppedge, M. (1996), "El concepto de gobernabilidad. Modelos positivos y negativos." In *Ecuador: un problema de gobernabilidad*, compiled by PNUD CORDES. Quito: PNUD CORDES.

Craston, M. (1983), "Are There Any Human Rights?" *Journal of the American Academy of Arts and Sciences* 112 (4): 1-17.

Crozier, M.; Hungtinton, S., and Watanuki, J. (1975), *The Crises of Democracy, Report on the Governability of Democracies to the Trilateral Commission.* New York: New York University Press.

Cunill, N. (2008), "La construcción de ciudadanía desde una institucionalidad pública amplia." In *Contribuciones al debate: Democracia/Estado/Ciudadanía. Hacia un Estado de y para la democracia en América Latina* II, compiled by R. Mariani, 113-138. PNUD-UE.

Drucker, P. (1974), *Management tasks, responsibilities, practices*. New York: Harper Collins Publishers.

Espinosa, M. (2004), "Historia y cultura política de la participación ciudadana en la Ciudad de México: entre los condicionamientos del sistema y el ensueño cívico." *Andamios* 1: 9-50.

Fleury, S. (2004), "Construcción de ciudadanía en entornos de desigualdad." In *¿Democracia con desigualdad? Una mirada de Europa hacia América Latina*, edited by C. Binetti and F. Carrillo, 133-169. New York: Banco Interamericano de Desarrollo.

García, N. (1995), *Consumidores y ciudadanos.* México: Grijalbo.

Giddens, A. (2000), *Un mundo desbocado, los efectos de la globalización en nuestras vidas.* Madrid: Taurus.

Giglia, A., and Winocur, R. (1996), "La participación en la radio: entre inquietudes ciudadanas y estrategias mediáticas." *Perfiles Latinoamericanos* 5 (9): 73-84.

Guerrero, M. (2006), "Medios de comunicación y la función de transparencia." *Cuadernos de Transparencia* 11, México: Instituto Federal de Acceso a la Información y Protección de Datos.

Habermas, J. (1987), *Teoría de la acción comunicativa. Volumen 2: Crítica de la razón funcionalista.* Madrid: Taurus.

Hansson, S. (2002), "Las inseguridades en la sociedad del conocimiento." *Revista Internacional de Ciencias Sociales* 171: 1-12. Accessed April 21, 2014. http://www.oei.es/salactsi/rics171.htm

Hoffman, D.; Novak, T., and Schlosser, A. (2001), "The evolution of the digital divide: Examining the relationship of race to internet access and usage over time." In *The Digital Divide: Facing a Crisis or Creating a Myth?,* compiled by B. Compaine, 47-97. Cambridge, Massachussets: The MIT Press.

Kauffman, D.; Kraay, A., and Zoido-Labaton, P. (2000), "Aggregating Governance Indicators." *Policy Research Working Paper* 2195: 1-35. Accessed May 25, 2008. http://www.worldbank.org/wbi/governance/pdf/agg_ind.pdf

Kenis, K., and Schneider, V. (1991), "Policy Networks and Policy Analysis." In *Policy Networks: Empirical Evidence and Theoretical Considerations*, edited by B. Marin and R. Mayntz, 25-59. Frankfurt: Campus Verlag.

Kohler-Koch, B. (1996), "Catching up with change: the transformation of governance in the European Union." *Journal of European Public Policy* 3: 359-380.

Lechner, N. (2000), "Nuevas Ciudadanías." *Revista de Estudios Sociales* 5 (January): 16-24.

Majone, G. (1997), *Evidencia, argumentación y persuasión en la formulación de políticas.* México: Fondo de Cultura Económica.

Martín-Barbero, J. (1999), "El miedo a los medios. Política, comunicación y nuevos modos de representación." *Nueva Sociedad* 161 (May-June): 43-56.

—— (2001), *Claves de Debate: Televisión pública, televisión cultural: entre la renovación y la invención.* Guadalajara: ITESO.

Marshall, T. H. (1997), "Ciudadanía y Clase Social." *Revista Española de Investigaciones Sociológicas* 79: 279-334.

Mayntz, R. (2000), "Nuevos desafíos de la teoría de *Governance." Instituciones y desarrollo* 07: 1-10. Accessed January 15, 2014. http://www.iigov.org/id/index.drt?edi=187626

—— (2002), "National states and global governance." Paper presented at *VII Congreso Internacional del CLAD sobre la Reforma del estado y de la Administración Pública*, Lisboa, October 8-11.

McCarney, P.; Halfani, M., and Rodríguez, A. (1998), "Hacia una definición de 'gobernanza." *Proposiciones* 28: 118-155.

Molyneux, M. (2000), "Gender and Citizenship in Comparative Perspective." In *Towards a Gendered Political Economy*, edited by J. Cook, J. Roberts and G. Waylen, 121-144. Houndsmills: Macmillan.

Morales, E. (1990), *Sociedad e información.* Paper presented at 9ª Reunión Interamericana de Bibliotecarios y Documentalistas Agrícolas, AIBDA/II-CA, San José.

O'Donnell, G. (1979), *Democracy and Bureaucratic Authoritarianism in Latin America.* Berkeley: Institute of International Studies.

O'Donnell, G. (1993), "Estado, Democratización y ciudadanía." *Nueva Sociedad* 128 (November-December): 62-87.

Offe, C. (1979), *Ingobernabilidad. Sobre el renacimiento de teorías conservadoras de la crisis.* Frankfurt: EDUCA.

Pasquino, G. (2005), "Gobernabilidad." In *Diccionario de Política,* edited by N. Bobbio, I. Mateucci and G. Pasquino, 14th Spanish edition, 703-710. México: Siglo XXI Editores.

Peña, C. (2005), "Ciudadanía y reconocimiento: el lugar de las minorías." *Revista Derecho y Humanidades* 11, 99-103.

Peters, G. (1998), *R. A. W. Rhodes, Understanding Governance: Policy Networks, Governance, Reflexivity and Accountability* 76 (2): 394-396. Blackwell Publishing, Public Administration.

Pierre, J., and Peters, G. (2000), *Governance, politics and the state.* New York: Macmillan.

Prats y Catalá, J. (1996), *Gobernabilidad democrática en América Latina finisecular.* Washington: BID.

Programa de las Naciones Unidas para el Desarrollo (2003), *El acceso a la Información, nota práctica.* New York: PNUD.

Przeworski, A., and Wallerstein, M. (1988), "Structural Dependence of the State on Capital." *American Political Science Review* 82 (1) (March): 11-29.

Ramírez, C. (2013), *La satisfacción de las necesidades de información y el cambio de identidad en la comunidad indígena amuzga.* México: UNAM-IIBI.

Ramírez, P. (2003), "El espacio público: ciudad y ciudadanía. De los conceptos a los problemas de la vida pública local." In *Espacio público y reconstrucción de ciudadanía*, compiled by P. Ramírez, 31-58. México: FLACSO, Miguel Ángel Porrúa.

Ríos, J. (2014), "El concepto de información: dimensiones bibliotecológica, sociológica y cognoscitiva." *Investigación Bibliotecológica* 28 (62): 143-179.

Roche, M. (1987), "Citizenship, social theory, and social change." *Theory and Society* 16 (3): 363-399.

Rodríguez, A. (2006), *La brecha digital y sus determinantes.* México: UNAM-CUIB.

Sakaiya, T. (1995), *Historia del Futuro. La sociedad del conocimiento.* Santiago de Chile: Andrés Bello.

Scharpf, F. (2000), "Economic Changes, Vulnerabilities, and Institutional Capabilities." In *Welfare and Work in the Open Economy Volume I: From Vulnerability to Competitiveness in Comparative Perspective*, edited by F. Scharpf and V. Schmidt, 21-124. Oxford: Oxford Scholarship.

—— (2001), *European Governance: Common Concerns vs. The Challenge of Diversity.* MPIfG Working Paper 01/6. Accessed December 16, 2013. http://www.mpi-fg-koeln.mpg.de/pu/workpap/wp01-6.htm

Servon, L. (2002), *Bridging the Digital Divide. Technology, community and public policy.* Oxford: Blackwell Publishing.

Thurow, L. (1996), *El futuro del capitalismo.* Buenos Aires: Javier Vergara Editor.

Toffler, A. (1990), *El cambio del poder.* Barcelona: Plaza & Janés.

Torres, G., and Ramos, A. (2008), "Gobernanza y territorios. Notas para la implementación de políticas para el desarrollo." *Revista Mexicana de Ciencias Políticas y Sociales* 50 (203) (May-August): 75-95.

Torres, G., and Ramos, A. (2012), "Nueva gestión de lo local. Desarrollo rural y construcción de sistemas agroalimentarios." In *Gobernabilidad y gobernanza en los albores del Siglo XXI y Reflexiones sobre el México contemporáneo*, compiled by B. Lerner, R. Uvalle and R. Moreno, 99-136. Estado de México: IIS-UNAM, IAPEM.

Turner, B. (1990), "Outline of a Theory of Citizenship." *The Journal of the British Sociological Association* 24 (2):189-217.

Velásquez, F., and González, E. (2003), *¿Qué ha pasado con la participación ciudadana en Colombia?* Bogotá: Fundación Corona.

Vieira, L. (1998), "Ciudadanía y Control Social." In *Lo Público No-Estatal en la Reforma del Estado*, edited by L. Bresser-Pereira and N. Cunill. Buenos Aires: Paidós.

Webster, F. (1995), *Theories of the Information Society.* London: Routledge.

Williamson, O. (1979), "Transaction-Cost Economics: The Governance of Contractual Relations." *Journal of Law and Economics* 22 (2) (October): 233-261.

—— (1994), *The Mechanisms of Governance.* New York: Oxford University Press.

Winocur, R. (2002), *Ciudadanos en los medios. La construcción de lo público en la radio.* Buenos Aires: Gedisa.

—— (2003), "La invención mediática de la ciudadanía." In *Espacio público y reconstrucción de ciudadanía*, compiled by P. Ramírez, 231-277. México: Miguel Ángel Porrúa, FLACSO.

Ziccardi, A. (1998), *Gobernabilidad y participación ciudadana en la ciudad capital*. México: UNAM, Miguel Ángel Porrúa.

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Current information architecture trends in digitized cartography collections

Beatriz González Suárez *
María Victoria Nuño Moral **

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Abstract

This paper provides an analysis of the Information Architecture (IA) of websites of organizations devoted to assembling and disseminating collections of digitized nineteenth century maps. For this purpose, researchers examine the following website features: Identity and Information, Language and Writing, Labels/Headings, Site Structure and Navigation, Display of Information, and Search and Help functions. This examination reveals both strengths and weakness of each website, while also underscoring how poorer performing websites might improve. A questionnaire designed

* Centro de Información Cartográfico y Territorial de Extremadura, Consejería de Fomento, Vivienda, Ordenación del Territorio y Turismo, España. beatriz.gonzalezsuarez@gisvesa.com
** Universidad de Extremadura, España. mvnunmor@alcazaba.unex.es

in previous research and adapted to this sample was applied. The analysis of each organization provides a qualitative assessment of the data gathered, and relevant conclusions are drawn from aspects assessed.

Keywords: Digital Map Libraries; Information Architecture; Historical Maps.

Resumen

Tendencias actuales de arquitectura de información en colecciones cartográficas digitales españolas
Beatriz González-Suárez y *María Victoria Nuño-Moral*

El objetivo principal del presente trabajo es realizar un análisis, tomando como punto de partida la Arquitectura de la Información (AI), de los sitios web de entidades que recogen material cartográfico anterior a 1901 en formato digital y lo difunden a través de Internet. Para ello se examinan aspectos relacionados con los siguientes ítems: Identidad e Información, Lenguaje y Redacción, Rotulado, Estructura y Navegación, Presentación de la Información, Búsqueda y Ayuda. Se pondrá de manifiesto cuáles son los puntos fuertes y débiles de cada entidad, reflexionando cuál ha de ser la tendencia que deben tener las entidades cuyos resultados sean más negativos.
Para desarrollar dicha evaluación, se ha elaborado un cuestionario a partir de trabajos previos, adaptándolo a la muestra objeto de estudio. El análisis individual de cada organismo conlleva una valoración cualitativa de los resultados obtenidos, extrayendo las conclusiones más relevantes sobre los aspectos evaluados.

Palabras clave: Cartotecas Digitales; Arquitectura de la Información; Cartografía Histórica.

Introduction

Information Architecture (IA) is defined as the science or discipline that organizes and structures web sites so the user can locate, gain access to and use the information they contain (Pérez-Montoro Gutiérrez, 2010; Rosenfeld and Morville, 2002).

What makes a website attractive to the user is the contents it holds. To this end, it is important to be clear about just what to show on each page or section, how to group content, how to display it and under what tags, etc. IA focuses on these issues in order to help websites be inviting to users.

The user who enters a cartography webpage comes with specific needs: he wishes to see diverse collections of maps or find concrete documents quickly and easily. The maxim of IA is "Everything where it is expected." When a website fails to live up to this motto, the *user's experience* and the site *usability* may be deemed poor. Both of these aspects are directly related to the webpage design, where IA is a determining factor. As such, any site, including a map archive site, must provide users with all of the information demanded and display it just as the user wishes to see it.

In general terms, an information architect is the professional devoted to refining the objectives of the site, providing a functional profile for the contents and designing how information can be found. IA relies on series of interdependent components or systems that allow relevant information of each website to be found and retrieved. To achieve this with any efficiency, a standardized language must be adopted and employed for each of the following systems:

1. By means of the diverse schemes and structures, the *system of organization* takes care of planning and organizing the websites to make them useful. The first are centered on grouping and classifying the items of information under a criterion (by topic or chronology, or alphabetically). Meanwhile, the structures establish the interdependencies of each of the groups previously established.
2. The *labeling system* shall conceptualize each of the options, groups or links used in the site. The object is for these labels or headings to posit a mental representation of the content they hold.
3. The *navigation system* shall allow the user to move within the site while also providing a method for orientation. In this way the so-called *cognitive overload* is prevented. Said systems may be global (navigation menus that exist on every page of the site), local (planned for a specific page) and contextual (those that allow movement between contents).
4. The *search system* shall facilitate the localization and retrieval of what the user demands. As stated by Pérez-Montoro Gutiérrez (2010), proper implementation is based on a balance between information displayed in search results and the total number of results achieved.

In this light, the main aim of this paper is to analyze Spanish map archive websites from the standpoint of IA.

From cartography to the digital map archive

The concept of cartography comes from the Greek *chartis*, meaning map, and *graphein*, which means written. Of the many definitions one might find, we cite the one provided by the International Cartographic Association (ICA), which states: "the art, science and techniques for making maps, charts and sections, three-dimensional models and globes representing Earth or any other heavenly body in any scale" (Zentai, 2012: 7. Translated from Spanish).

The United Nations Organization, meanwhile, defines cartography as "the art and science of creating a two-dimensional representation of a given part of earth's surface. The features represented may be real objects (topographical maps) or concepts and features that are more abstract (topical maps)" (ONU, 2000: 202. Translated from Spanish). Finally, the official website of the Instituto Geográfico de Venezuela Simón Bolívar (2011. Translated from Spanish) defines cartography as: "the art of making maps or the technique of making a flat representations of the spatial components of the earth, including the activities and developments of man."

On the basis these definitions, cartography may be understood as the science, art and technique of representing a territory and it features. The definition of what a map is was taken up by the 17th General Assembly of the ICA, which proffers the following definition:

> A symbolic image of geographic reality, representing selection of details of features, which is the result of the creative preferences and efforts of the author and designed primarily to depict spatial relations. (Hansen Albites, 2008: 9)

As stated by Fallas (2003: 1), a map is "the graphic, scale representation of a portion of the earth's surface showing only some features or attributes of the reality." Thus, the basic data gathered in this paper are:

- Title
- Date of data gathering and date of publication
- Legend, detailing the equivalence between information gathered in the map and its representation of the same

- Projection and *datum*: essential information needed to process and handle a map within a geographic information system (Fallas, 2003).
- Scale: the ratio between the reality and the map dimensions
- Author: person or entity creating the document
- Source, indicating primary sources (traveler and explorer logs, field study, tele-detection studies) or secondary sources (other maps and documentary sources) (Hansen Albites , 2008).

In light of these general ideas regarding cartography and maps, what are we to make of digital cartography? While analogue cartography is printed, frequently using polyether paper support,[1] digital cartography requires computer assisted systems and programs (computer or CAD assisted design) in its design, treatment and use. It also requires geographic information systems and spatial data infrastructures, etc. The usefulness of digital cartography is quite varied and depends on the topical context in which it is used. As a whole, it acts like many other disciplines of knowledge, which implies that it is not working in a vacuum. According to Marín Hernández and Vargas (2010):

> […] the impact of the information systems has occurred in several areas: uses of SIG as tools and instruments to aid public management and decisions making, development of economic geography, urban question or rational cartography in cultural, social and political terms [among others].

Along these lines, Zentai (2012: 8. Translated from Spanish) explains that "the function of maps has changed considerably in the digital age: maps are no longer simple products, and now are special collections of information that offer a growing array of functions by exploiting the data base behind the map." The image of the map on screen, in this conception, hides the data used to create it.

On this basis, the earlier idea of digital cartography may be understood as the product of digitizing and processing old maps, for the case at hand, those drawn before 1901. It is based on scanning or photographing old maps and manipulation of the image in order to achieve the highest yield, whether offering such products to the user (main mission) or for inclusion in the Spatial Data and Geographic Infrastructure Information Systems (e.g., by means of geo-referencing). Since such sources are already published and written,

1 The current standard in Spain specifying the support paper for maps is UNE 57.048-77, titled: *Papel. Papel cartográfico para usos generales.* (AENOR, 2011).

their data cannot be manipulated. As such, the trend in this field is to employ information resources techniques to enhance the performance of this type of documents.

The following is a list of standards that are useful in the description of these documents and the exchange of information with other organization. The firts two standards are for making general descriptions of documents, and the remainder are for describing general geographic information.

- ISBD (CM): Bibliographic description and identification for cartographic material that orders descriptive elements and provides a points system for the same. This is used largely in libraries.
- Dublin Core (Weibel and Koch, 2000): Metadata model created and promoted by the Dublin Core Metadata Initiative (DCMI), which develops and maintains the specifications to support the description and standardization of resources, allowing the description of all kinds of resources regardless of format, area of specialization or cultural origin (Sánchez Maganto, Nogueras Iso and Ballari, 2008).
- ISO 19115:2003: Metadata standard that defines a scheme for describing geographic information and the services it provides. It provides information about the identification, measurement, quality, spatial-temporal scheme, spatial reference and the distribution of the digital geographic data.
- Núcleo Español de Metadatos (NEM): The Spanish Metadata Nucleus establishes a set of the minimum recommended metadata needed for proper description of resources associated with geographic information (series of complete product, sheets or units, etc.) within Spain (Sánchez Maganto, Nogueras Iso and Ballari, 2008).

Finally, the matter of cartographic archive or map collection (*cartoteca*, in Spanish-language coinage) is addressed. Despite the fact that the term is in wide use, it does not appear in the Diccionario de la Real Academia Española de la Lengua.[2] We understand *cartoteca* to mean the set of cartographic documents gathered and catalogued by specialized personnel for later use and dissemination. These map archives exist for the purpose of disseminating such information, either through on-site consultation or over the internet. Otherwise they would become mere document depositories. This dissemination

2 Nonetheless, there are initiatives such as that undertaken by Luisa Martín Merás, who has requested the inclusion of the term *cartoteca* in the 23rd Edition of the *Diccionario de la Lengua Española* (Blanco García, 2010).

can be carried out facsimile, microfilm, slides, etc. Nonetheless, the method most often used today is the digital image form offered in online collections.

Thus, a digital *cartoteca* is a repository of digital indexes that allows viewing and downloading of cartographic contents, while also providing relevant metadata and catalogue descriptions, as per ISBD, MARC or XML formats. Its creation allows both the general and specialized user to consult catalogues and materials from the conservation center at any time. As stated by Fernández Wyttenbach and Bernabé Poveda (2011: 132. Italics added. Translated from Spanish):

> *Virtual cartotecas* are the solution for enjoying access via internet to antique map collections distributed by diverse libraries and archive around the world […]. Internet access to map collections multiplies the applications that facilitate the work of researchers and document specialists, while promoting the publication and dissemination of cartographic heritage.

Methodology

This paper uses an IA perspective to assess the websites run by online historical cartographic archives. The data was gathered from October 2013 to January 2014. Following the latest edition of the *Reglasde Catalogación* released in 1999, antique maps are all those released before 1901.

The process of selection of the cartographic entities was performed on the basis of the *Directorio de cartotecas y colecciones cartográficas en instituciones españolas* (Líter Mayayo, 2012) and the paper: "Evaluación de las interfaces de consulta de las Colecciones digitales patrimoniales españolas" (Sulé Duesa, Estivill Rius and Gascón García, 2011). The filters applied to achieve the sample were as follows:

- The sample was limited to organizations providing online access via internet; that is, to organizations that publish the digital image of the document.
- Inventories or catalogue services (OPAC) were excluded.
- Those that do not contain cartographic material are excluded as are cartographic archives sites that do not provide antique maps.
- The results of the following archives: Corona de Aragón, Archivo de la Real Chancillería de Valladolid, Archivo General de Simancas, Archivo Histórico Nacional and its Sección Nobleza, and the Archivo Histórico Provincial de Álava are embraced by the Archivo General de Indias.

This is because consultation of their respective collections is performed through Portal PARES (Portal de Archivos Españoles of the Ministry of Education, Culture and Sports (http://pares.mcu.es/). As such, the results can be extrapolated for this entire subset.

- Similarly, the specific results of the Biblioteca Digital de Castilla la Mancha, the Biblioteca Virtual de Aragón, the Biblioteca Virtual de la Rioja, the Biblioteca Virtual del Principado de Asturias or the Biblioteca Virtual Sierra Pambley are contained in the Biblioteca Regional de Madrid, all of which were designed by the same company (DIGIBIS Aplicaciones y estándares al servicio de la sociedad del conocimiento, www.digibis.com), so results can be extrapolated to all of these sites.

In this way, a sample of 22 entities was selected, which appear in *Table 1.*

Table 1. List of entities included in study sample.

ID	Entity	URL entity
1	Archivo de Villa. Ayuntamiento de Madrid (Memoria de Madrid)	http://www.memoriademadrid.es/index.php
2	Archivo del Patronato de la Alhambra y Generalife	http://www.alhambra-patronato.es/ria/handle/10514/16
3	Memoria Digital Vasca	http://www.memoriadigitalvasca.es/
4	Universitat de Lleida (Fons Sol-Torres)	http://soltorres.udl.cat/
5	Archivo General de Indias (PARES)	http://pares.mcu.es/
6	Archivo Histórico Provincial de Zaragoza	http://servicios3.aragon.es/opac/app/simple/ahpz
7	Archivo Real y General de Navarra (Biblioteca Navarra Digital)	http://www.navarra.es/home_es/Temas/Turismo+ocio+y+cultura/Archivos/Archivos/Archivo+General+de+Navarra/ (página del archivo) https://administracionelectronica.navarra.es/binadi/busqueda.aspx (página de la BND)
8	Arquivo do Reino de Galicia (Galiciana)	http://www.galiciana.bibliotecadegalicia.xunta.es/cartograf/gl/micrositios/inicio.cmd
9	Archivo General de la Región de Murcia	http://archivoweb.carm.es/archivoGeneral/arg.inicio
10	Biblioteca Nacional de España (Biblioteca Digital Hispánica)	http://www.bne.es/es/Catalogos/BibliotecaDigitalHispanica/Inicio/index.html
11	Biblioteca Regional de Madrid (Biblioteca Digital de la Comunidad de Madrid)	http://www.bibliotecavirtualmadrid.org/bvmadrid_publicacion/i18n/estaticos/contenido.cmd?pagina=estaticos/presentacion
12	Centro de Información Cartográfica y Territorial de Extremadura (Cartoteca Histórica Digital de Extremadura)	http://217.124.180.27/dguot/Cartoteca/index.html

13	Institut Cartogràfic de Catalunya (Cartoteca Digital)	http://cartotecadigital.icc.cat/
14	Instituto de Cartografía de Andalucía (Buscador de Cartografía Histórica)	http://www.juntadeandalucia.es/institutodeestadisticaycartografia/cartoteca/buscar/search
15	Instituto Geográfico Nacional (Fondos Cartográficos)	http://www.ign.es/fondoscartograficos/
16	Instituto Geológico y Minero de España	http://www.igme.es/internet/sistemas_infor/carto/prin_index.htm
17	Real Academia de la Historia	http://bibliotecadigital.rah.es/dgbrah/es/estaticos/contenido.cmd?pagina=estaticos/presentacion
18	Universidad Autónoma de Madrid. Departamento de Geografía (Cartoteca "Rafael Mas")	http://biblioteca.uam.es/cartoteca/default.html
19	Biblioteca Valenciana Digital	http://bv2.gva.es/es/cms/elemento.cmd?id=estaticos/paginas/inicio.html
20	Biblioteca Virtual del Patrimonio Bibliográfico	http://bvpb.mcu.es/es/estaticos/contenido.cmd?pagina=estaticos/presentacion
21	Biblioteca Digital de la Región de Murcia	http://bibliotecadigital.carm.es/inicio/index.php
22	Biblioteca Virtual de Andalucía	http://www.bibliotecavirtualdeandalucia.es/opencms

Source: By author

A series of dichotomous, qualitative analytical variables were established and appear in *Table 2*. These were designed on the basis of diverse documents and materials. There is a growing literature on evaluation of web sites, many of which do not agree on the general assessment criteria or provide a specific application.

The earliest relevant works regarding IA of websites were published in the late 1990s. Two pioneer works by Caywood (1995) and Nielsen (1995) propose methodologies. The assessment template used in this paper coincides with several of the aspects proposed by the former with regard to access conditions (URL, search engines, standards), resource design and use of adequate language, etc. On the other hand, Nielsen stresses evaluation of parameters such as help and information to users in making search queries and use of language accessible to the user.

From another angle, Ciolek (1996) examines the structuring exemplified in such features as ease of access, and acceptable resource and content design, as well as the display of information or the language of the same. Along these same lines, though circumscribed to the context of the library, Smith (1997) brings together a set of library assessment "tools" for the purpose of helping the user assess information found in such centers. Olsina's (1999)

doctoral thesis provides a list of attributes that comprise the methodology he uses for evaluating the quality of websites.

In the next decade Jiménez Piano (2001) establishes a questionnaire for public and private institutions, and resources with marked scientific features. His work coincides with the section referring to the use of clear and identifiable URLs, updating of resources, navigation and search engines, and display in diverse navigators and identification of the resource owner, etc. Moreover, the approach offered by Codina (2006) also coincides with some of the features analyzed in this paper, such as identification of authorship, target audience, objectives, updating, navigation queries, labels and searches, etc. Finally, the work *Thinking Critically about Web 2.0 and Beyond* (Grassian, 2008) evaluates aspects of resource information and identity, as well date, user registry or ease of navigation. This analysis adapted the "Guía de Evaluación Heurística de sitios Web" developed by Hassan Montero and Martín Fernández (2011), and brings together the greatest number of elements associated with the systems that comprise IA. The template used has been modified and adapted to the object of study. For example, the "Display of Information" block, whose elements of analysis are pertinent to the websites examined, has been included.

The questionnaire applied to each web site agency contains 57 queries, grouped in eight blocks, some of which are not directly quantifiable, but rather come as a result of the display and evaluation of the web site as a whole. An intense analysis of diverse features contained in the following sections has been performed for each entity:

1. General Attributes: objectives, contents, services offered, and design and site structure; in addition to coherence and degree of updating of contents.
2. Identity and Information: corporate identity and means of contacting the company, in addition to data protection and copyright.
3. Language and Writing: quality of the text contents.
4. Labels/Headings: signification and familiarity of labels and headings used for contents.
5. Structure and Navigation: structure of navigation, organization and use of hypertext links.
6. Display of Information: The way in which visual resources are deployed and the operations offered to users (download, printing and metadata).

7. Search: site search function and its options.
8. Help: documentation and contextual help offered to the user for navigation and consolation.

Table 2. Heuristic analysis indicators

General Attributes
1.1 Are the website objective concrete and well defined?
1.2 Are the contents and services offered congruent with stated objectives?
1.3 Does the website have the proper URL that is clear, correct and easy to remember?
1.4 Are the websites' internal URLs clear and pertinent?
1.5 Does the website provide an accurate and complete outline of the contents and services it offers?
1.6 Is the websites' general structure geared toward the user?
1.7 It the website's general design coherent?
1.8 Is there an indication of when the website was last updated?
1.9 Are some contents offered in several languages?
1.10 Is the website compatible with the search engines?
1.11 Does the page admit publicity?
1.12 Does the resource have a presence in social media?
1.13 Are its contents syndicated?
1.14 Are the free and pay services clearly differentiated?
Identity and Information
2.1 It the identity of the company/website clearly shown on all pages?
2.2 Does the slogan or tagline, genuinely express what the company is and the services it offers?
2.3 Is the logo meaningful, identifiable and sufficiently visible?
2.4 Does the logo link to home page?
2.5 Is there a link to information about the company, website, webmaster, etc.?
2.6 Does the site provide contact information and mechanisms?
2.7 Does the website provide information regarding protection of personal data of clients or copyright of website contents?
2.8 Is one required to register in order to gain access to any of the resources?
2.9 Does the website offer a user feedback function?
Language and Writing
3.1 Does the website use the language of users?
3.2 Does it employ a friendly, familiar and intimate tone?
Labels/Headings
4.1 Are the labels/headings meaningful?
4.2 Are standard labels/headings used?
4.3 Is a single, well-defined, clear system of organization used?
4.4 Does the website use a controlled, accurate system of label and headings?
4.5 Are page titles correct and the result of planning?
Structure and Navigation
5.1 Are links easily recognized?
5.2 Do clicked links indicate their current status (visited, active, etc.)?
5.3 Do all links take the user to a page with content?
5.4 Does each page have a forward and back button?

5.5	Are there navigation elements (breadcrumbs or home button) to orient the user with regard to location?
5.6	Does the webpage offer a site map or search functions for those wishing to gain direct access to contents without need of navigating?
5.7	Do link images include a title feature describing the page to be visited?
5.8	Do all pages link to other pages?
5.9	Does website offer a virtual tour?
5.10	Does website include links to external sites?
	Display of Information
6.1	Are visual resources such as thumbnails displayed (PDF, DOC, TXT)?
6.2	Are visual resources such as thumbnails of image files displayed (JPG, TIFF)?
6.3	Can images be downloaded and/or printed?
6.4	Do images come with associated metadata?
6.5	Do images offer any added value, such as geo-referencing?
6.6	Do images contain protective water marks?
6.7	Is content provided in other media formats such as (CD-ROM, printed, etc.)?
	Search
7.1	Is it easily accessible and recognizable as such?
7.2	Are advanced searches allowed?
7.3	Does it display search results in a way that is understandable to the user?
7.4	Is help provided to the user when a search come ups empty?
7.5	Does the search function employ controlled documental language (key words, thesaurus, and subject headings)?
7.6	Does it contain classification and/or topic and onomastic indexes?
7.7	Can recent searches be accessed?
	Help
8.1	Is there a Help section?
8.2	Is the Help link clearly visible and always the same in appearance?
8.3	Does the Help section provide Frequently Asked Questions?

Source: By author

Finally, after analysis of each of the 22 entities in the sample, the aggregate results obtained were examined. For the purpose of exposition and consequent conclusions, the following compliance values for the diverse assessment items shall be used: 1 = YES (indicating compliance with indicator) and 0 = NO (indicating failure to comply).

Results

The eight basic analytic blocks appear in the left-most column, with the number of 57 total items assessed appearing in parenthesis (as per *Table 2*). The first row represents the number assigned to each of the 22 entities assessed (shown in *Table 1*). The results of the analysis performed are shown in *Table 3* under 'Totals."

Table 3. Results obtained by entity and sections

Id Entity	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
General Attributes (14)	8	9	11	5	11	8	10	8	8	10	8	7	10	5	8	6	8	7	10	11	9	11
Identity and Information (9)	6	7	7	6	6	6	7	6	9	7	4	6	8	5	5	6	5	4	7	7	5	7
Language and Writing (2)	2	2	2	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Labels/Headings (5)	5	3	2	1	2	4	5	5	5	2	5	5	5	4	4	2	5	5	5	4	2	5
Structure and Navigation (10)	7	5	5	5	7	6	7	4	9	6	5	8	6	5	4	6	5	8	6	7	6	8
Display of Information (7)	4	5	4	3	6	4	4	4	2	6	5	5	4	4	4	2	5	2	5	4	5	6
Search (7)	4	4	5	5	5	6	4	6	3	4	6	5	5	4	2	4	5	2	3	5	4	3
Help (3)	0	2	2	0	2	2	0	1	2	2	1	3	2	1	1	2	2	0	2	2	2	0
Totals (57)	36	37	38	25	39	38	39	36	40	39	36	41	42	30	30	30	37	30	40	42	35	42

Source: By author

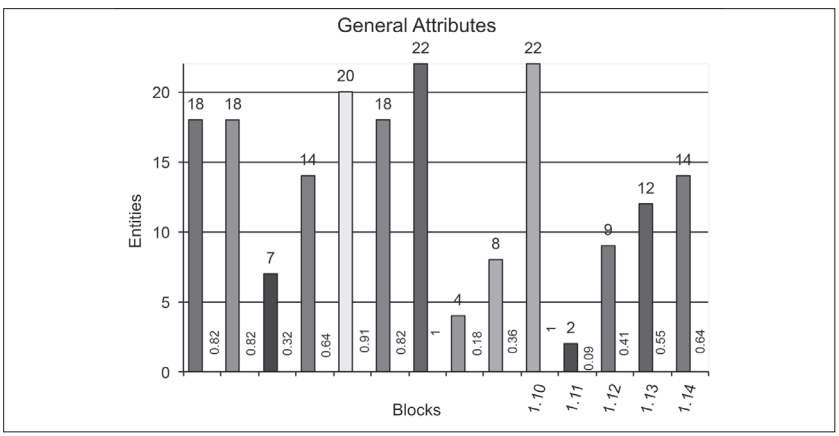
The most relevant results obtained for each of the eight blocks are presented below:

General Attributes

Most to the websites exhibit an accurate, well-defined correspondence between the presentation of objectives and the contents and/or products offered. Moreover, general structure and coherence in the design of entryway and internal pages are conscientiously upheld. Among those features requiring improvement, the following are the most significant:

- The use of permanent internal URLs that can be easily memorized, known as "semantic" URL; i.e., those that faithfully represent the content or subject area of the website and which are easily remembered by the user.
- Indication of the dates of creation and latest update of content, which would lend greater credibility to the site.
- Translation into other languages, at the very least into English, especially those that are part of the *Europeana* network of cultural institutions.
- Presence in social networks to ensure dissemination (news, collection held, etc.) to a broader range of users. Likewise, the matter of syndicating contents should be revisited in order to keep the user informed regarding the new features and services provided by the website.

Chart 1. Results obtained in the General Attributes section.



Source: By author

As shown in *Chart 1*, while 100% of the entities analyzed exhibit a design coherent with content (1.7) and are compatible with any navigator (1.10), only 9.0% include advertising in their pages (Biblioteca Digital Hispánica and the cartographic collections of Instituto Geográfico Nacional). Likewise, only four institutions provide indication of latest update of contents and services. For their part, Memoria Digital Vasca and Biblioteca Virtual del Patrimonio Bibliográfico do not provide content update notices, they do publish current news and events on their respective home pages. The Archivo Histórico Provincial de Zaragoza is the only website that has a devoted content update notice, while the Biblioteca Digital de la Región de Murcia provides a current date without any notice of recent updates.

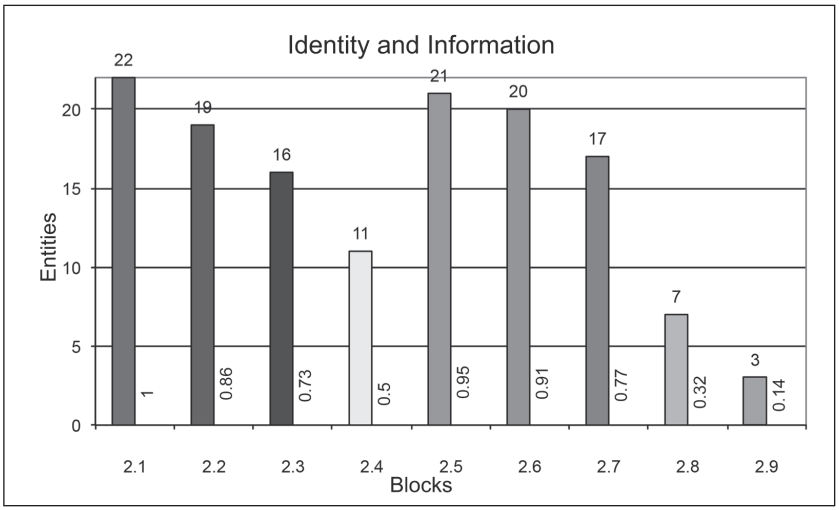
Identity and Information

Most of the entities examined use a logo and a tagline to identify both the resource and its contents. Moreover, they offer information about the entity or website and mechanisms for making contact. The following areas, however, stood out as needing improvement:

- Use of logo as anchor for homepage, which would help the user undo the navigation when he so desires. Compliance with this indicator was evident only in half of the sample.
- Some entities do not have information on protection of personal data and/or copyright.
- Lack of user registry at the time of accessing content. Requiring the user to enroll would allow the entity to examine user/visitor profile, the type of searches performed, count the number of times content is accessed, etc., all of which can serve, in turn, to guide improvement of the website.
- In this regard, it is also recommendable to include a user complaint/feedback function.

As shown in *Chart 2*, most entities in the sample offer users information about the institution as well as contact information. Only three entities in the sample, however, provided a user feedback mechanism (Fons Sol-Torres, Archivo Real y General de Navarra and the Archivo General de la Región de Murcia).

Chart 2. Results for Identity and Information.



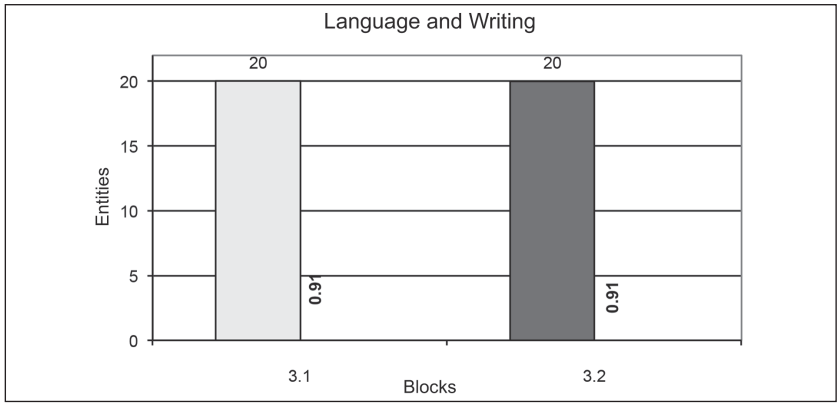
Source: By author

Language and Writing

The results obtained for both queries are the same. As shown in *Chart 3*, these criteria are adequately met by all entities except Fons Sol-Torres and Portal de Archivos Españoles (PARES), largely because the users visiting these sites are laypersons with regard to the specialized scientific contents of the site. The assessment of the factor depends on whether the user continues to visit or otherwise desists because of the opaqueness of the language employed.

The website of Fons Sol-Torres employs a complicated user interface in terms of search and use of language. Rather than deficient use of language, we find linguistic barriers in the overuse of English and Catalan, a situation that restricts the user's ability to navigate and search. The PARES website employs highly technical and overly efficacious terms from the field of documental science, such as signature, description index, exact signature, incomplete signature, search strategies, etc. These terms can confuse the user.

Chart 3. Results for Language and Writing.

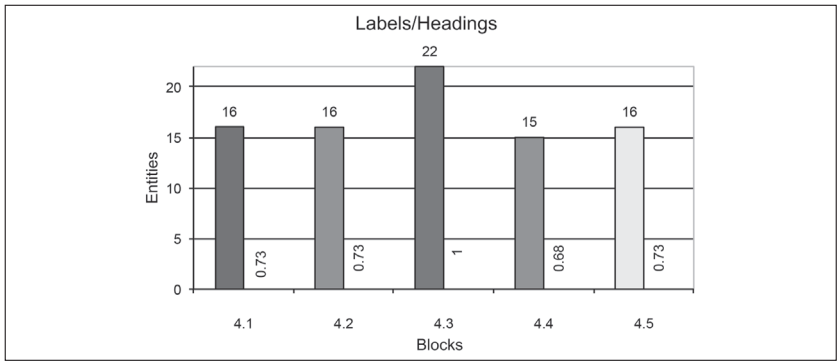


Source: By author

Labels/Headings

Half of the entities complied with 100% of the indicators. Standard and meaningful labels and headings are used for each option or task. Moreover, these labels or headings are controlled and accurate while existing within a well-defined and organized system. Additionally, the title of the main page and the title of the source code *title* element are the same. This is very important because it is the first thing the user encounters on the page and constitutes the first opportunity to provide the user with concrete, accurate information about the contents of the resource. The other 50% of the sample should undertake a review of these matters to prevent leading the user down blind alleys.

Chart 4. Results obtained for Labels/Headings.



Source: By author

The relationship and link between queries 4.1 (meaningful headings), 4.2 (standard labels) and 4.4 (controlled, accurate heading system) is quite evident as shown in *Chart 4*. Fully 73% of the entities analyzed employed meaningful headings that express a defined concept.

The remaining 27 % employ headings that confuse the user, such as the cases of Memoria Digital Vasca and Fons Sol-Torres, which incur in this problems for the reasons already described previously. The use of a foreign language can encumber many users. When a foreign language is used in task headings, this can make interaction with the system very difficult. When standardized, meaningful headings and not used, the user can feel lost or confused during the navigation/consultation process.

The website PARES also fails to meet this standard in that it employs specialized language in its headings. The Biblioteca Digital Hispánica, with its structure oriented to organization, uses headings that stress internal procedures. The Instituto Geológico y Minero de España (IGME) has the same content appearing under several different headings, i.e., the collection, catalogues and digital library comprise the same collection. In this way the user receives erroneous orientation during searches. Finally the Biblioteca Digital de la Región de Murcia also uses headings that cause confusion. The option "Content Search" takes the user to a search window and a set of links to selected documents of diverse types and topics; under the heading "Catalogue Search," a screen appears with advanced search options.

Structure and Navigation

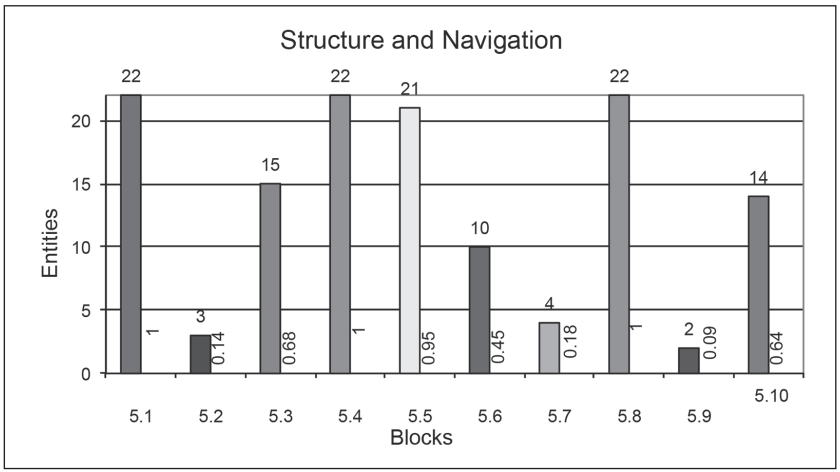
Under this section, only 14% of the sample entities distinguish their links (largely through the use of color) once they have been clicked. This visual prompt undoubtedly helps orient the user. Orphan pages, i.e., those without content did not appear in any of the sample websites; however, there were both misdirected links and links that failed to function properly. Likewise, this percentage reflects the presence of navigation elements that orient the user, including breadcrumbs, forward and back buttons in internal pages and a link to homepage by clicking the logo.

Thus, the poorest assessments came in for following features:

- Inclusion of a site map or internal search function in order to gain direct access to contents without need of navigating.

- Links to external sites. Links to official sites in the same field should be considered. Also links to similar sites in other parts of the world should be provided.
- Review the *title* attribute of the resource images to aid search engines find the resource quickly and thereby improve the positioning of the query result.

Chart 5. Results obtained in Structure and Navigation.



Source: By author

The data shown in *Chart 5* demonstrate that map archives serve to aid and orient the user. This is evident in the results of parameter 5.1 (recognizable links), 5.4 and 5.8 (orientation elements). Interestingly only 9.0% of the sites evaluated (PARES and the Archivo General de la Región de Murcia) include a virtual tour of installations and collections.

Display of Information

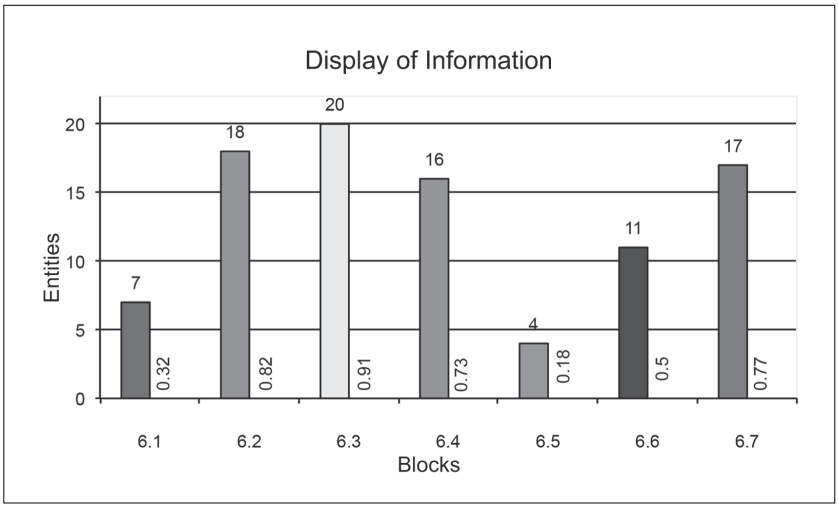
Chart 6 shows that all entities offer digitized contents that can be properly viewed (mostly in JPG and PDF files) by users. Likewise, most of the entities allow downloading and/or printing of images. Only two entities do not offer this option: Arquivo do Reino de Galicia (Galiciana) and the Instituto Geológico y Minero de España).

A high percentage of entities offer standardized descriptions of their records. The most frequently used standards are ISBD, MARC, ISO 19115,

METS, Dublin Core and EDM (Europeana Data Model). Additionally, most of the materials they hold have been presented in other media such as print editions (catalogues, inventories) and expositions, etc.

The poorest results are seen in the use of water marks, a copyright and use protection device appearing in only 50% of the sample. Low scores are also seen for the parameter of allowing exploitation beyond simply viewing.

Chart 6. Results obtained for Display of Information.



Source: By author

Search

All of the websites have an identifiable search system that provides understandable results for the user. Nonetheless, not all of the entities include the search function in the same site. For example, sites run by Memoria de Madrid, Fons Sol-Torres and Biblioteca Digital de la Comunidad de Madrid place the search function in the upper left, while Archivo del Patronato de la Alhambra and Generalife have it at the bottom of the page. In contrast, the sites for Histórico Provincial de Zaragoza, el Arquivo do Reino de Galicia, and others have it in the center of the page. Eighteen of the 22 sample entities offer advanced search options

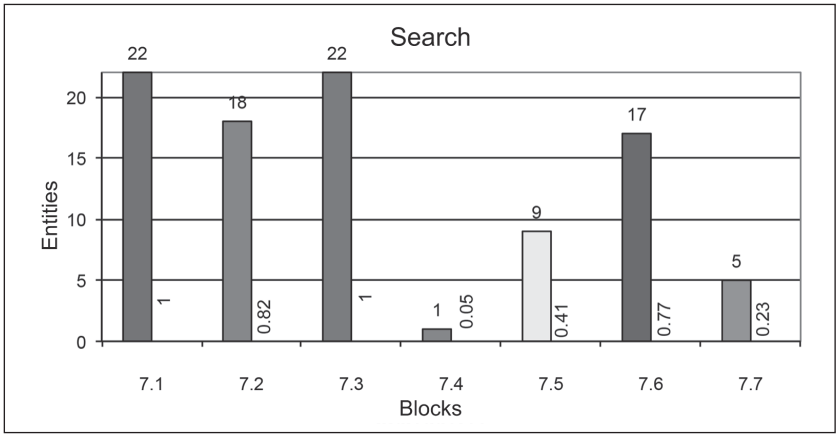
For the parameter of use of documental languages (key words, thesaurus, material headings), this is allowed in only 9 of the sample entities, while in-

dexes and/or classification (thematic, geographic, chronological) are evident in 17 entities.

As shown in *Chart 7*, the area of user help (7.4) needs to be seriously reviewed. Only the Institut Cartogràfic de Catalunya fulfills this function, while all other entities merely "inform" the user of the lack of results without offering alternatives. Many websites also need to include a direct link for users to the latest searches, as only 23% offer this function.

In this block, the Instituto Geográfico Nacional stands out in that it is not equipped with a search function per se, but rather provides three consultation options: Geographic search, Text search and Geographic entities search, which are not otherwise included in the first option.

Chart 7. Results obtained for Search.

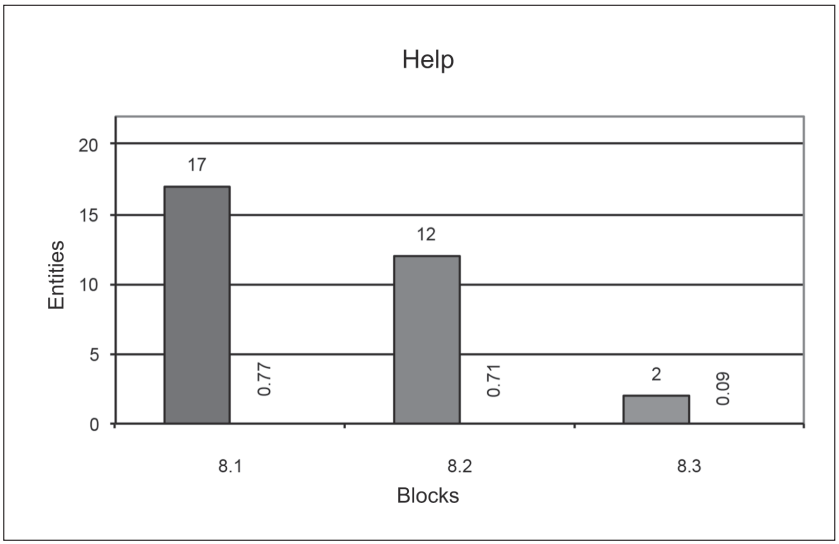


Source: By author

Help

Finally, *Chart 8* shows that only 17 sample entities have a Help section to guide users through the diverse tasks and options available. Of these, 12 websites place the button on the upper right of the page, while the rest place it in less common places. As for FAQs, only Cartoteca Histórica Digital de Extremadura and Memoria Digital Vasca provide this resource. Moreover, Biblioteca Virtual de Andalucía and Fons Sol-Torres provide neither Help nor FAQs.

Chart 8. Results obtained for Help.



Source: By author

Conclusions

In view of the results obtained, we can assert that *cartotecas* tend to present their information as merely digitized objects, without providing much added value beyond viewing. The diverse cartographic archival entities (*cartotecas*) employ the elements and resources inherent to IA in many ways. The design of pages must be cohesive throughout the site with all features aimed at helping the user find the documents and information sought. One might ask what distinguishes one *cartoteca* from another, and the answer may be found in IA. From this perspective, the content presented is as important as how it is presented and the degree of user accessibility attained.

The digital cartographic archival entities should aim to facilitate user consultations in order to achieve higher degrees of user satisfaction through the use of diverse help elements. In this light, it is odd that many websites included in European collaborative networks are available only in the home language. Moreover, these websites do not exploit social networks in any significant way, despite their growing importance, nor do they exploit syndication of contents. All of these avenues should be explored, since the current

trend in the field is to establish collaboration networks or work groups with the aim of sharing and unifying knowledge.

Works cited

AENOR (2011), *Papel. Papel cartográfico para usos generales*. UNE 57048:1971, Madrid: AENOR.

Blanco García, Ángel (2010), "Las cartotecas universitarias en España: un universo desconocido." Paper presented at *IV Ibercarto*, Valencia, October 28-29.

Caywood, Carolyn (1995), *Library Selection Criteria for WWW Resources*. http://www.keele.org.uk/lt/Internet/criteria.htm

Ciolek, T. M. (1996), "The Six Quests for The Electronic Grail: Current Approaches to Information Quality in WWW Resources." *Review Informatique et Statistique dans les Sciences humaines* 1-4. http://www.ciolek.com/PAPERS/six-quests1996.html

Codina, L. (2006), *Metodología de análisis y evaluación de recursos digitales en línea*: *parámetros e indicadores.* http://www.lluiscodina.com/metodos.htm

Fallas, J. (2003), *Conceptos básicos de cartografía.* Heredia, Costa Rica: Universidad Nacional. http://www.mapealo.com/Costaricageodigital/Documentos/alfabetizacion/intro_carto.pdf

Felicísimo, Á. M. (1994)*, Modelos Digitales del Terreno: introducción y aplicaciones en las ciencias ambientales.* Oviedo: Pentalfa. http://www.google.es/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&cad=rja&ved=0CDQQFjAB&url=http%3A%2F%2Fwww.researchgate.net%2Fpublication%2F232423519_Modelos_digitales_del_terreno._Introduccin_y_aplicaciones_en_las_ciencias_ambientales%2Ffile%2F79e41508a6f8c5c4c7.pdf&ei=3XvJUvDnKep0QWQ3IHADg&usg=AFQjCNHpoOYJIMe6ks4zHwezg6LC_z2Dag

Fernández Wyttenbach, A., and Bernabé Poveda, M. Á. (2011), "La cartoteca virtual: salvaguardia y accesibilidad al patrimonio documental cartográfico." *Revista PH* 77: 132-138. www.iaph.es/revistaph/index.php/revistaph/article/view/3120

Grassian, E. (2008), *Thinking Critically about Web 2.0 and Beyond*. http://www.sscnet.ucla.edu/library/modules/Judge/CLThinkWeb20.pdf

Hansen Albites, F. A. (2008), *Apuntes de cartografía.* Aguascalientes, México: Instituto Nacional de Estadística y Geografía. http://www.inegi.org.mx/inegi/spc/doc/INTERNET/Apuntes%20de%20cartograf%C3%ADa.pdf

Hassan Montero, Y., and Martín Fernández, F. J. (2011), "Guía de Evaluación Heurística de Sitios Web." *No Solo Usabilidad* 2. http://www.nosolousabilidad.com/articulos/heuristica.htm

Herrero Rico, J. L. (2000), "Cartografía digital y Espeleología." *Lapiaz* 27 (March): 2-4. http://ocw.um.es/cc.-sociales/deportes-de-aventura/material-de-clase-1/cartografia-digital-y-espeleologia-01.pdf

Instituto Geográfico de Venezuela Simón Bolívar (2011), *Sistema cartográfico: Conceptos básicos: cartografía.* http://sigot.geoportalsb.gob.ve/abrae_web/cartografia/

International Federation of Library Associations and Institutions (1987), *ISBD (CM): International Standard Bibliographic Description for Cartographic Materials.* London: IFLA. http://www.ifla.org/files/assets/cataloguing/isbd/isbd-cm_1987.pdf

International Organization for Standardization (2003), *Geographic information: Metadata. ISO 19115:2003.* Ginebra: ISO.

Jiménez Piano, M. (2001), "Evaluación de sedes web." *Revista española de Documentación Científica* 24 (4): 405-432. http://redc.revistas.csic.es/index.php/redc/article/viewArticle/69

Líter Mayayo, C. (2012), *Directorio de cartotecas y de colecciones cartográficas en instituciones españolas.* Madrid: Biblioteca Nacional de España. http://www.bne.es/es/Colecciones/docs/DirectorioCartotecas.pdf

Marín Hernández, J. J., and Vargas, H. (2010), "La cartografía histórica georreferenciada: un punto de encuentro en el análisis estadístico regional." Paper presented at X Congreso Centroamericano de Historia, Nicaragua, July 12-15. http://hcentroamerica.fcs.ucr.ac.cr/Contenidos/hca/cong/mesas/x_congreso/regional/cartografia-georeferenciada.pdf

Nielsen, J. (1995), *10 usability heuristics for User Interface Design.* http://www.nngroup.com/articles/ten-usability-heuristics/

Olsina, L. A. (1999), "Metodología cuantitativa para la evaluación y comparación de la calidad de sitios web." PhD diss., Argentina: Universidad Nacional de la Plata, Facultad de Ciencias Exactas. http://di002.edv.uniovi.es/~cueva/investigacion/tesis/WebsiteQEM.pdf

ONU (Organización de las Naciones Unidas. Departamento de Asuntos Económicos y Sociales) (2000), *Manual de sistemas de información geográfica y cartografía digital.* Nueva York: Naciones Unidas. http://unstats.un.org/unsd/publication/SeriesF/SeriesF_79s.pdf

Pérez-Montoro Gutiérrez, M. (2010), *Arquitectura de la información en entornos web.* Gijón: Trea.

Reglas de Catalogación (1999), Madrid: Ministerio de Educación y Cultura, Centro de Publicaciones: Boletín Oficial del Estado. http://www.bne.es/es/Servicios/NormasEstandares/ReglasDeCatalogacion/Docs/00000022.pdf

Rosenfeld, L., and Morville, P. (2002), *Information Architecture for the World Wide Web*, 2nd. Edition, California: O'Reilly Media.

Sánchez Maganto, A.; Nogueras Iso, J., and Ballari, D. (2008), "Normas Sobre Metadatos (ISO19115, ISO19115-2, ISO19139, ISO15836)." *Mapping* 123 (January): 48-57. http://www.academia.edu/316388/Normas_Sobre_Metadatos_ISO19115_ISO19115-2_ISO19139_ISO15836

Smith, A. (1997), "Testing the Surf: Criteria for evaluation of Internet Information Resources." *The Public-Access Computer Systems Review* 8 (3): 5-23. http://www.vuw.ac.nz/staff/alastair_smith/Evaln/Index.Htm

Sulé Duesa, A.; Estivill Rius, A., and Gascón García, J. (2011), "Evaluación de las interfaces de consulta de las colecciones digitales patrimoniales españolas." *Anales de documentación* 14 (2): 20-21. http://revistas.um.es/analesdoc/article/viewFile/113931/124971

Weibel, S. L., and Koch, T. (2000), "The Dublin Core metadata initiative." *D-lib magazine* 6 (12). http://mirror.dlib.org/dlib/december00/weibel/12weibel.html

Zentai, L. (2012), "Does cartography still exist?" *Proceedings AutoCarto 2012*, Columbus, Ohio, September 16-18. http://www.cartogis.org/docs/proceedings/2012/Zentai_AutoCarto2012.pdf

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Analysis of the authorship of the scientific output on Levantine and Schematic post-Paleolithic rock painting in Spain (1907-2010)

Miguel Ángel Mateo Saura *
Isidoro Gil Leiva **
Antonio Pulgarín Guerrero ***

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Abstract

The body research comprised of more than two-thousand titles on post-Paleolithic cave art in Spain spanning the one-hundred and three years (1907-2010) is examined in terms of author productivity, collaboration patterns, foreign authorship, and the structural dynamics of scientific collaboration. The study concludes that research in the field of post-Paleolithic cave painting continuous to rely on individual authors and authors not associated with any institutional organ.

* Instituto de Estudios Albacetenses Don Juan Manuel, España. mateosaura@regmurcia.com
** Universidad de Murcia, España. isgil@um.es
*** Universidad de Extremadura, Badajoz, España. pulgarin@alcazaba.unex.es

Keywords: Bibliometrics; Authors; Scientific Cooperation; Prehistory; Rock Painting; Post-Paleolithic Painting; Levantine Art; Schematic Painting.

Resumen

Análisis de la autoría en la producción científica sobre pintura rupestre postpaleolítica de los estilos levantino y esquemático en España (1907-2010)
Miguel Ángel Mateo-Saura, Isidoro Gil-Leiva y *Antonio Pulgarín-Guerrero*

A más de un siglo de investigación sobre la pintura rupestre postpaleolítica en España, que ha llevado a una producción científica que supera los 2 000 registros, se lleva a cabo un estudio para evaluar su rendimiento durante el periodo 1907-2010. Se presentan los resultados obtenidos tras el análisis de la productividad de los autores, de la colaboración científica, del papel de la autoría extranjera en la producción científica y de la estructura y dinámica de los grupos de investigación. Se concluye que la investigación sobre la pintura rupestre postpaleolítica en España sigue descansando en el trabajo individual y en autores independientes que carecen de adscripción institucional.

Palabras clave: Bibliometría; Autores; Colaboración Científica; Prehistoria; Pintura Rupestre; Pintura Postpaleolítica; Arte Levantino; Pintura Esquemática.

Introduction

After a period of nearly 25 thousand years of cave paintings in the territory of modern Spain, several other graphic and cultural expressions supervened that may be collectively called post-Paleolithic cave art, which individually are attendant to various social, cultural and economic milieus. The two major post-Paleolithic styles are the Levantine, whose makers are currently the subject of much debate (though many researchers associate these works with the last wave of Mesolithic hunters occurring in the tenth to the fourth centuries BC); and the Schematic style linked to the first groups of Neolithic tool makers inhabiting the Iberian peninsula in the fourth to the third centuries BC.

While Levantine art developed in the pre-coastal range of the Iberian Peninsula parallel to the Mediterranean Sea from Lérida and Huesca in the north moving to the south toward Jaén and Almería, the Schematic art style attained a larger geographic range and can be found throughout the Iberian Peninsula, from the Mediterranean coast to the Atlantic in the lands around Cadiz to the northern reaches of Castilla-León.

While each style is associated with groups with distinct economic and social features (Mateo Saura, 2009), they also exhibit some similarities that have fueled speculation about the affiliations between them (Mateo Saura, 2001). Most of the representations in both styles are painted on the walls of small overhangs (in calcareous terrains formed by the reaction of wind erosion and rain water and that dissolves the soft rock) and receive direct light. Along the Mediterranean coast of the Iberian Peninsula the two styles are often found in the same rocky niche. An analysis of the features of these shallow caves and overhangs, including the typology of the sites, their orientation, altitudes and the position of the painted figures on the walls suggest several parallels between the two styles.

Though more research needs to be done in this area, we also observe similarities in technical details, such as the composition, (Hernanz Gismero and Ruiz López, 2012; Montes Bernández and Cabrera Garrido, 1992; Ripoll Perelló, 1961; Roldán García, 2009, 2012); and in representational treatment, in which the artist exploits simple lines to define easily identifiable forms. The use of lines, of course, is distinctive to each style. While the Levantine style uses narrow lines with well-defined edges, the Schematic style generally uses thicker lines with fuzzier definition. Both styles generally exploit red dyes, though black paint is also common to both. The Levantine artwork found in the Albarracín región in Teruel also uses white paint. The size of the painted motifs range from 5 to 50 cm, though there are some miniature paintings of a few scant millimeters and others larger than one meter in length.

The main differentiating feature between the styles lies in the expressive language each deploys. The Levantine style is naturalistic, allowing the diverse motifs to be recognized. For example, a bowman and a cervix are easily discerned thanks to the rendering of their morphologies. In contrast, the Schematic style employs abstraction, which not only reduces forms to basic linear expression, but also posits coded signs that cannot be readily identified by an uninitiated reader.

In terms of iconography, this degree of abstraction is the major difference between the two styles. Levantine art depicts human and animal figures in narrations of the hunt, human figures involved in warfare and in domestic activities, often featuring women gathering food. There are also large grouping of archers and other human groupings whose meaning escapes us. Some paintings show herds of animals without the presence of hunters. On other occasions a single animal is portrayed in the sheltered space. The Schematic style also exhibits human and animal figures involved in both hunting and herding activities. These figures, however, are accompanied by a variety of symbols that are to be interpreted by their formal similarity to things we vaguely recognize but cannot identify with any certainty.

In this general context and over the course of one-hundred years of research on post-Paleolithic art in Spain, the question of the identity of the creators of this art is perhaps one of the most widely researched and debated. The training of researchers is perhaps something that best reveals this situation. If since the early twentieth century, when archeology was a new discipline, until the middle of the century, research on prehistoric art was in the hands of priests, such as Henri Breuil or Hugo Obermaier; and geologists, such as Eduardo Hernández Pacheco, or persons associated with the fine arts, such as Juan Cabré or Juan Bautista Porcar, since the 1960s archeologists and prehistoric history specialists take center stage just as the Pre-History, Archeology and Ancient History specializations are founded in the Spanish university system. In recent years, researchers have begun to explore prehistoric art as something other than exclusively aesthetic phenomena. In addition to addressing aesthetics, these studies include examinations of technical, ideological and symbolic factors. These technical studies have opened the way for contributions from disciplines such as Physics, Chemistry, Biology and Informatics.

Most research done these days, with few exceptions, is carried out by research teams. This occurs for many and sundry reasons, including controlling costs, widening scope and advantages in securing funding (Rusell, Madera Jaramillo and Ainsworth, 2009; Valenciano *et al.*, 2010; Zulueta, Cabrero and Bordons, 1999). Along this line, Beaver and Rosen (1978) describe a long list of reasons for collaboration, which in addition to those cited include gaining access to certain abilities or technical teams in order to save and optimize time, acquiring experience and multiply training opportunities, while also overcoming intellectual isolation and preparing disciples. Whatever the motivation for working in teams, the practice exerts a positive effect on the productivity of researchers and the visibility of the works they produce.

Scientific collaboration is without a doubt a hallmark of modern science. Price (1963) stated that by the end of the twentieth century individual research would be gone and collaboration the norm, predicting a collaboration rate of 2.5 authors per paper. Even though the rate of collaboration has increased significantly in the experimental fields, the Humanities and social sciences, in general, are still far from attaining Price's rates (Over, 1982). In any case, collaboration is an indicator of the degree of professionalization of a scientific community (Sancho, 1990) and of the economic support the science receives, since such investment usually serves to promote the formation of teams (Agulló Martínez and Aleixandre Benavent 1999).

In the bibliographic analysis of scientific output on post-Paleolithic art of both the Levantine and Schematic styles found in Spain and published between 1907 to 2010, the question of the identity of the creators in conjunction with scientific production itself constitute two sides of the same coin. If the bibliographic indicators provide information regarding the size, growth, development, visibility and structure of the research process (Agulló Martínez, 1998; Bordons and Zulueta, 1999; Maltrás Barba, 2003; Terrada, 1971, 1973), the indicators of production, based on the measurement of scientific output (López Piñero and Terrada, 1992), will reveal concrete features such as the growth of the science and the chronological development of scientific output, and also the productivity of researchers, their degree of collaboration and cooperation among institutions. The structural dynamics of the research groups that produce and consume documents will also be shown (Bordons and Zulueta, 1999; González de Dios, Moya and Mateos, 1997; Sancho, 1990).

A bibliometric analysis of authorship of research on post-Paleolithic art in Spain published between 1907 and 2010 ad the structure of the research groups is the object of this study.

Material and Method

Since there is no single referential data base bringing together all the papers published in the field, we have been forced to consult several sources of information. As such, the following resources have been consulted: the ISBN database for books and monographs; the TESEO database for doctoral theses; the ISOC database of CSIC for scientific articles and lectures read in conferences; the Dialnet database; the Web of Science database; the biblio-

graphic collection of *Corpus* de Pintura Rupestre Levantina del Instituto de Historia del CSIC; the cataloge of the Biblioteca de Humanidades de la Universidad de Murcia; and the catalogue of the Biblioteca del Centro de Arte Rupestre de Moratalla (Murcia). Likewise, wide reading of scientific articles in the field of cave art over these decades and special attention to the bibliographies of the same provided a significant number of references.

Search terms specific to the field of cave art, such as "rock art," "cave art," "Levantine art," "Levantine painting", "Schematic art" and "Schematic painting"[1] were used to query the catalogues and the national and international databases cited. These terms were used to retrieve documents held in Subject, Title, Summary fields. When nothing was retrieved, the Any Field option was used.

Using the extensive bibliography used in the BA degree project by Mateo Saura (1992) and the documents drawn from the queries of the diverse resources mentioned, a data base of 2,186 entries was built using *Microsoft Access.* As of the March 31, 2011 the last records were entered into the data base.[2]

This *ad hoc* data base of 2,186 entries was structured to include fields serving our purpose. With the database set and the records found dumped into the same, the task of homogenization of the data ensued, a process that resulted in the reliable identification of authorship. Bibliographic data bases often contain records of an author who is named in several different ways. The maternal last name is often omitted or the name is abbreviated excessively, e.g., with the second initial appearing in a compound name. This circumstance inserts doubt about whether all of the variants refer to the same person or whether they correspond to as many authors as there are variants.

As such, we have attempted to record all authors with both paternal and maternal surnames. To do so we have gone directly to the ambiguous documents for orientation one way or the other. Some of the indicators used include the coincidence of geographic area or field sites under study, places of work or the eventual association of the author to collaborative research teams. For those cases still resistant to this approach, we have resorted to a criterion used in other work (Abad Pérez, 1987; Miguel Dasit, 2003) and we entered such names variants as distinct authors. Likewise, the abbreviations

1 The actual Spanish terms used in the search are as follow: "arte rupestre", "pintura rupestre", "arte levantino", "pintura levantina", "arte esquemático" o "pintura esquemática".

2 The data base can be consulted at: http://webs.um.es/isgil/

"and others," "*et alii*", or "*et al.*" have been eliminated and the surnames and complete names of all credited authors recorded.

For the study of scientific output of authors, the simplest, most often used indicator is obtained by counting the number of credited authors. This approach has proven that most scientific output is driven by a small number of very productive authors, working with many authors who only occasionally contribute. One might argue that greater output is not necessarily correlated to greater importance; however, the correlation between output and scientific relevance has been proven. The first researcher to understand this and express it mathematically was Lotka (1926). His study examined the distribution and frequency of papers published by 8,216 authors, showing that for each paper published by an author the number of authors declined in a regular way. Our work, performed on the basis of the methodology proposed by Pao (1985) and Nicholls (1986), has verified "Lotka's Law."

We have also calculated the productivity index proposed by Price (1963) on the basis of the logarithm decimal of the number of publications by authors. This allows us to define productivity groups of low, medium and elite authors, using the productivity index of an author whose position in the distribution of authors corresponds to the square root of the total number of authors. We have also calculated the "transitory index" (closely associated with the productivity index), defined as the number of authors who publish only one paper (Price and Gürsey, 1976). This index allows us to weigh the degree of maturity of the scientific field and its consolidation as an area of study.

Scientific collaboration, which can occur in areas as varied as co-authorships, informal communication of ideas and projects in meetings and congresses or exchange of correspondence, is often very hard to measure. Perhaps this is why the question of collaboration is examined from the standpoint of co-authorship. The indicator that provides us the information is the credit/work index, or collaboration index in the terminology of Lawani (1986). Likewise, the analysis of collaboration on the basis of authorship provides us with other indicators, such as participation of foreign authors in research on post-Paleolithic cave art in Spain. It also tells us about Spanish authors who publish abroad. Both of these measures are fairly reliable indicators of the degree of internationalization of the field of study.

The establishment of research teams is a direct consequence of scientific collaboration. This is commonly associated with what Price (1963) called invisible colleges, understood as scientific groups researching a single object but working in different, often faraway, places, who engage in exchange of information other than through conventional printed media. Most bibliometric studies of networks are based on citations of the publications thereby revealing the relationship structure among scientists. In our case, however, the general lack of references to citations and the concomitant absence from citation indexes in question (because Spanish journals are not indexed in international data bases) invalidates this approach. As such, we approach collaboration groups from the angle of co-authorship.

To delimit these groups and include the collaborating authors, we began with the methodology used in Bordons *et al.* (1995), and Zulueta, Cabrero and Bordons (1999), which acknowledges the most productive researchers as the lead author. This author must have published at least one paper per year over the period under study. For an author to be assigned to a group, he must have signed at least 60% of his production with the lead author. The occasional authors (1-2 published papers) are not assigned to a group. The group must be made up of at least three authors; and the groups established on the basis of co-authorship (rather than institutional affiliation) may include authors from other institutions. Because of the exclusive features of our data, we have had to perform a specific adaptation to some of these general criteria. If a researcher going years without publishing is taken as an exclusion factor, several of the most productive authors would be excluded. If we were to exclude the occasional authors, who represent more than 75% (Mateo Saura, 2013) and those whose output does not reach the 60% co-authorship with lead author threshold, we would paint only a partial and very unrealistic picture of scientific collaboration in the field of cave art in Spain.

To learn the degree of cohesion of the groups, we calculated the density on the basis of the relationship between the number of links established by each group and the number of possible links between members of the same (Otte and Rousseau, 2002; Valderrama *et al.*, 2007; Valenciano *et al.*, 2010). Finally, Pajek software was used to generate the graphs showing these networks (Batagelj and Mrvar, 2007).

Results and discussion

The documental typology of the 2,186 works on Levantine and Schematic style cave art published between 1907 and 2010 in Spain and abroad constitute the basis of our study. This typology breaks down as follows: 1,208 papers (55.26%), 421 lectures delivered in congresses; (19.25%), 248 chapters in collected works (11.34%), 218 monographs (9.97%), 52 notes (2.37%), 23 PhD dissertations (1.05%) and 16 undergrad degree final projects (0.73%). This variety of typology exerts an impact on diverse aspects of the authorship itself, especially with regard to the parameters of collaboration. Some document types are signed by a single author, such as dissertations and undergraduate degree final projects. Other types of works tend also to be signed by a single author, such as monographs and book chapters; but co-authorship is the preferred route in papers read at congresses and journal publications. In all events, as shown in the section on collaboration, the discipline under study exhibits a clear penchant for individual authorship across all document typologies.

Author output study

The 2,186 documents analyzed were produced by 846 authors. Of these 484 have published a single work, and account for 57.21% of the author sample. Another group of 130 (15.36%) authors has published two works and 63 (7.44%) authors have published three works, while 29 (3.42%) share credit in four articles, and 19 researches (2.24%) share credit in up to five works. This trend continues until we reach a subset of highly productive authors, "super-productive" in the words of Martínez Fernández (1996). This group is comprised of twelve authors (1.41%) who have published ≥40, of which there are two authors having signed 92 and 93 works, respectively, and one, Antonio Beltrán Martínez, with 179 publications (*Table 1*).

Table 1. Distribution of works by author

Works	Authors	% authors
1	484	57.21
2	130	15.36
3	63	7.45
4	29	3.43
5	19	2.24
6-10	57	6.74
11-15	23	2.72

16-20	12	1.42
21-25	9	1.06
26-30	6	0.70
31-35	1	0.11
36-40	3	0.35
≥41	10	1.18
Total	846	100

In accord with the productivity index obtained as a reference in our distribution of authors, which is 1.32 corresponding to Jesús Vicente Picazo Millán, an author who occupies 29th place (√346) in said distribution, we can define a first group of lesser producers, those who publish only one work and whose productivity index is equal to 0. This group is comprised of 484 authors (57.21%), who account for 14.45% of the total output. A second group, the medium producers (from 2 to 20 works) consist of 333 authors (39.36%), who account for 47.95% of the works. The last group of super-producers (≥21 publications), whose productivity index is equal to or greater than 1.32, consists of 29 authors (3.42%), who account for 37.60% of the publications.

These data also show that the highest productivity index of 2.25 is held by a single author (Antonio Beltrán Martínez) who has published 179 works. Moreover the transitory index determined by the number authors having published only once (Price and Gürsey, 1976) is 57.21%, which is quite interesting because this is a very reliable indicator of the degree of consolidation of the scientific activity in the field (Shubert and Glänzel, 1991). In this case, the transitory index may be considered quite high, though other fields exhibit transitory values even above 80% (Álvarez Solar, López-González and Cueto-Espinar, 1998).

With regard to Lotka's Law, once the slope of the authorship distribution and the constant are obtained (-1.79 and 0.5271, respectively, and the critical value is set (0.056), with a significance level benchmark of =0.01, and maximum difference of 0.047, we can safely assert that our sample matches a Lotka type distribution.

Within the subset of high producers there is a subset of 12 super producers (≥40 publications). These twelve authors account for 1.41% of the authors while producing 37.20% of the output (813 documents) (*Table 2*). The institutional affiliation of these super producers is also a point of interest, as only four of the 12 are associated with academic institutions. Antonio Bel-

trán Martínez works in the Universidad de Zaragoza; Mauro Severo Hernández Pérez in the Universidad de Alicante; Martí Mas Cornellá in UNED; and Eduardo Ripoll Perelló has worked at different times in the universities of Barcelona, Oviedo, Bellaterra and the UNED of Madrid. A fifth author, Vicente Baldellou, is the director of the Provincial Museum of Huesca. Of the remaining seven, five are teachers of secondary education, while Ramón Viñas Vallverdú and Alexandre Grimal Navarro are not associated with any university or cultural organism. Most of Ramón Viñas Vallverdú's output was achieved before 2005 without any affiliation to an official institution, and only since then on the basis of his membership in the Instituto Catalán de Paleoecología Humana y Evolución Social, while Alexandre Grimal is a painter without any institutional affiliation.

Table 2. Super-producers group (P.I. Productivity Index)

Nº	Author	Publications	%	P.I.	Research period	Institutional affiliation
1	Beltrán Martínez, Antonio	179	8.18	2.25	1954-2006	Universidad de Zaragoza
2	Mateo Saura, Miguel Ángel	93	4.25	1.97	1991-2010	Secondary school teacher
3	Alonso Tejada, Ana	92	4.20	1.96	1977-2010	Author without institutional affiliation
4	Viñas Vallverdú, Ramón	65	2.97	1.81	1971-2010	Instituto Catalán de Paleoecología Humana y Evolución Social (2005-2015)
5	Grimal Navarro, Alejandro	64	2.92	1.80	1985-2010	Painter
6	Baldellou Martínez, Vicente	60	2.74	1.77	1979-2010	Director del Museo Provincial de Huesca
7	Hernández Pérez, Mauro Severo	48	2.19	1.68	1982-2009	Universidad de Alicante
8	Mas Cornellá, Martí	47	2.15	1.67	1985-2009	Universidad Nacional de Educación a Distancia
9	Gómez-Barrera, Juan Antonio	44	2.01	1.64	1979-2010	Secondary school teacher
10	Ripoll Perelló, Eduardo	41	1.87	1.61	1951-1997	Universidad de Barcelona (1953-1968); Universidad Autónoma de Barcelona (1968); Universidad de Oviedo (1969); Universidad de Bellaterra (1970); Universidad Nacional de Educación a Distancia (1981-1988); Emérito de la Universidad Nacional de Educación a Distancia (1988-2006)

11	López Payer, Manuel Gabriel	40	1.87	1.60	1973-2009	Secondary school teacher
12	Soria Lerma, Miguel	40	1.82	1.60	1978-2009	Secondary school teacher

At another step in the output scale we have those authors with 10 to 39 works published. These authors exhibit a considerable variety of institutional affiliations. Among these 61 authors, publishing 835 works and accounting for 38.19% of the sample output, there are 27 (44.26%) university professors or authors associated with universities in some way at the time of publication. Another 23 (37.71%) are associated with cultural agencies, mostly as municipal museum directors, or hold posts within the general cultural directorates or similar agencies. The last group is comprised of 11 authors (18%) who work outside of university and official institutions, many of which are secondary or elementary school teachers.

Foreign authors

The participation of foreign authors in the research of post-Paleolithic cave art in Spain and the appearance of Spanish authors in foreign publications constitute the most reliable indicators for assessing the degree of internationalization of the field. In this regard, 72 foreign researchers have publications in the sample, which represents only 8.51% of the authorship. They are authors or co-authors of 193 works or 8.82% of the total output (*Figure 1*).

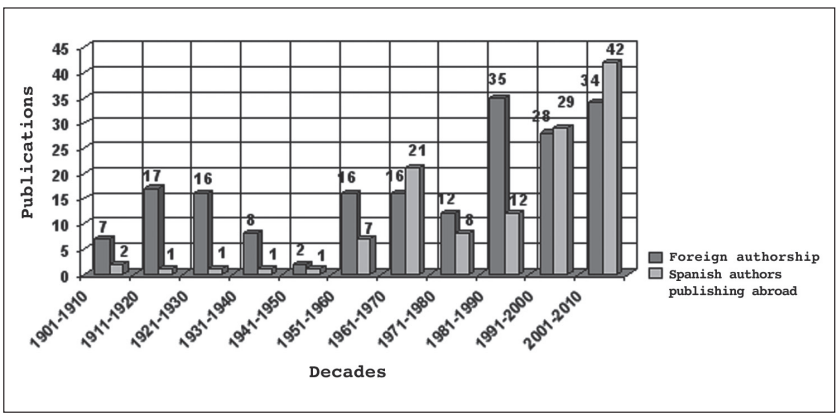

Figure 1. Distribution of production of foreign authors and Spanish authors publishing abroad

The work of foreign researchers is quite marked during the early years, when authors such as Henri Breuil and Hugo Obermaier monopolized the field. In fact over the first four decades of the study period, they published 43 works, which accounted for 82.69% of the output up to that time. These researchers were joined by other foreign researchers such as Paul Wernert, Herbert Kühn, Emil Cartailhac, Miles Burkitt, Henri Begoüen and George H. Luquet, who published largely in co-authorship with Henri Breuil. This is not surprising, since research on cave art in Spain at that time was largely in the hands of foreign institutions such as Instituto de Paleontología Humana de París. Spanish institutions such as the Comisión de Investigaciones Paleontológicas y Prehistóricas, often incorporated foreign researchers, including those already mentioned. The few Spanish authors, associated with fields as disparate as Natural Sciences or Fine Art played for the most part a complementary role, and it should be remembered that the field of prehistory and archeology hardly existed at all in those years in Spain.

Over the period of 1931 to 1950, the participation of foreigners in cave art research in Spain declined considerably. From 1941 to 1950 foreign participation was reduced to the status of testimonial, a period in which only two foreigners published work in the field. This may well be due to the general isolation of the country at that time. From the early 1980s forward the incidence of foreign authors began to rebound. In the last three decades of the study period, 97 foreign authors appear. The data for the last thirty years, however, could suggest a changing trend in foreign authorship of studies on post-Paleolithic cave art in Spain; though this extreme should be corroborated in a later study. In all events, the reticence of many Spanish journals to accept manuscripts in languages other than Spanish constitutes a serious obstacle to publication of submissions by foreign authors (Osca Lluch and Mateo Marquina, 2003).

Spanish authorship in foreign publications

The 82 Spanish authors who have published outside of Spain (9.69%) account for 125 works, which constitutes 60.97% of the output published abroad and only 5.71% of the total output (*Figure 1*).

The number of Spanish authors published in foreign publications is scant over the first fifty years of the study period. In fact, the few works we found are co-authorships with foreign lead authors who dominated the scene at the time, especially Henri Breuil and Hugo Obermaier. At the beginning of the

1950s we find a greater number of authors, including authors signing work individually. This trend hit a peak, in the ten year span of 1961-1970, in fact tripling the number of published works in the previous decade. The last twenty years has seen a greater number of Spanish authors published in foreign publications, though they still account for very low percentages of the total output. While the growth of foreign authors publishing in Spain in this field might suggest a shifting trend, we cannot assert the same with regard to Spanish authors publishing abroad. Only another study with a broader time span that the last twenty years would verify what appears to be a line of growth or, as warranted, show the opposite.

Analysis of scientific collaboration

The 2,186 documents bear 3,374 signatures, which comes to a collaboration index 1.54 of signatures to published work. The 1,462 documents signed by a single author comprise the largest group, accounting for 66.88% of the total output; while the other 724 (33.11%) works were collaborations. A large group comprised of 468 works signed by two authors represents 21.40% of total output and 64.64% of the collaboration subset. Works with three authors came to 147, 6.7% of total output and 20.30% of the collaboration subset; while those signed by four authors came to 67, which is 3.06% of total output and 9.25% of the collaboration subset. The 42 documents signed by five or more authors account for a mere 1.92% of the total output and 5.80% of the collaboration subset. Of this latter subset, there was one article with as many as eleven credited authors (*Table 3*).

Table 3. Distribution of signatures/works in the output set

Number of signing authors	Number of publications	% over collaboration	% over total output	Total number of signatures
11	1	0.14	0.04	11
10	1	0.14	0.04	10
9	3	0.41	0.14	27
8	3	0.41	0.14	24
7	9	1.24	0.41	63
6	5	0.69	0.23	30
5	20	2.76	0.92	100
4	67	9.25	3.06	268
3	147	20.30	6.72	441
2	468	64.64	21.40	938

1	1.462	-	66.88	1.462
Total collaboration	724		33.11	-
Totals	2.186	-	-	3.374

During the period under study, the greatest growth of scientific collaboration occurred in the last three decades, even though during the first three it was not altogether absent. Until 1970, the few collaborative works had at most three authors. In fact, of the 45 co-authored works up to that time, only five were signed by more than two authors. After the decade of the 1970s both the number of collaborative works and the ratio of co-authors to works increased significantly. Nonetheless, works signed by two authors remained the most common modality of collaboration, and holds for the entire period under study. In the ten years from 1991 to 2000, the percentage of multiple authorship rose to 40%, and in the next decade it rose to 41.45% (*Table 4*).

Table 4. Evolution of co-authorship over time

Decade/signatures (credits)	1	2	3	4	5	6	7	8	9	10	11
1900-1910	9	3	1	-	-	-	-	-	-	-	-
1911-1920	29	10	1	-	-	-	-	-	-	-	-
1921-1930	30	6	2	-	-	-	-	-	-	-	-
1931-1940	15	1	1	-	-	-	-	-	-	-	-
1941-1950	39	-	-	-	-	-	-	-	-	-	-
1951-1960	61	8	-	-	-	-	-	-	-	-	-
1961-1970	107	12	-	-	-	-	-	-	-	-	-
1971-1980	151	35	6	2	1	-	1	-	-	-	-
1981-1990	316	97	32	11	2	1	3	1	-	-	-
1991-2000	329	138	46	27	7	2	-	-	1	-	-
2001-2010	373	158	58	27	10	2	5	2	2	1	1
Without date	3	-	-	-	-	-	-	-	-	-	-
Total	1.462	468	147	67	20	5	9	3	3	1	1

The collaboration index of 33.11% obtained is slightly higher than that exhibited in the bibliometric study of Levantine rock art, in which collaborative work came to 23.07% (Cruz Berrocal *et al.*, 1999), which is also consonant with indices exhibited in other archeological areas. Analysis of works published in the pre-History journal *Trabajos de Prehistoria* to 1993 indicate a co-authorship rate of 28.52% (Rodríguez Alcalde *et al.*, 1993), while co-

authorship in the study of prehistory by Spanish and Portuguese historiographers came to 32.30% (García Marín *et al.*, 1997). In contrast, the percentage of co-authorship in the field of ancient ceramics is quite high at 78.32% (García Heras, 1997). This figure falls considerably to 59.01% when we look at collaborative works involving only archeologists. It is when we include specialists from experimental sciences that the collaboration rate shoots up to 75.32%.

The co-authorship index calculated for the *Boletín de la Asociación de Amigos de la Arqueología* came to 18.88%, of which 74.7% were signed by two authors (Rovira Llorens, 1994). In contrast the journal *Revista d'Arqueologia de Ponent* exhibits a collaboration rate of only 34.82%, with 49.57% of these works credited to two authors (Armada, 2009). The *Archivo Español de Arqueología* published 31 co-authored papers between 1985 and 1996, a mere 13.08% of total publications in that period (García del Toro *et al.*, 1999), while coauthored papers up to 1995 in *Cota Zero* came to 25.21% of the published research (Cruells, 1995).

The relatively low level of collaboration in archeology and prehistory journals (Rodríguez Alcalde *et al.*, 1996) is consonant with the low levels of co-authorship exhibited across the social sciences and especially the Humanities (Bordons and Gómez, 1997; Cronin, Shaw and La Barre, 2003), and in all events lower than that exhibited in the fields of experimental science and health (Over, 1982). Several bibliometric works have examined these matters of collaboration in the journals published by Universidad de Extremadura, where rates of 89% in the scientific fields were found versus a rate of 49% in the social sciences and the Humanities[3] (Pulgarín *et al.*, 2003, 2004). Alonso Arroyo, Pulgarín Guerrero and Gil Leiva (2005) obtained similar results in their study of collaboration in the Universidad Politécnica de Valencia, where the collaboration rate in journal publications came to 86.29%.

The low collaboration we found seems to indicate that the study of post-Paleolithic cave art exists at the margins of the general trend of science, and is in many ways a local, individual endeavor and has been since its inception.

3 As the authors of this study acknowledge, the distinct data sources in each case (international sources in scientific-technical fields and national in the fields of social sciences) could exert an effect on the final results.

The collaboration index, understood as the number of credited authors per work (Lawani, 1986), in our study came to 1.54. In the Humanities and Social Sciences the number for authors to works is 1-2, versus the ratio of 2.5-3.5 in experimental and technical fields (Bordons and Gómez, 1997; Sancho, 1990). As such, our collaboration index is below that of 2.6 found in archeological ceramics (García Heras, 1997), but quite near the index of 1.74 found up to 1993 in the journal *Trabajos de Prehistoria* (Rodríguez Alcalde *et al*., 1993).

Scientific output these days is increasingly a collaborative phenomenon. This collaborative approach exerts a positive impact on overall output, in that the most productive authors are also those who collaborate the most (Agulló Martínez and Aleixandre Benavent, 1999; Miguel Dasit, 2003; Valenciano *et al*., 2010). In the field of post-Paleolithic cave art, however, this is not the case. The existence 12 super producers (≥ 40 publications), accounting for 37.28% of total output, serves as evidence of the low levels of collaboration in the field. Of the 813 works published by these authors, 384 have been coauthored, which comes to 47.23% of their output. In contrast, the credits/work index is quite low, standing at 1.70, a figure explained by the prevalence of co-authorships of two (265 such papers), coming to 69.01% of co-authorship subset. Even though there are four super-productive authors signing a high percentage of the collaborative output, the other eight still have a credit/work index below 2. On one hand, this is because of the prevalence of works signed by a single author against those published in co-authorship; while on the other the coauthored subset is largely made up to works published by only two authors.

The output of the super producers is quite revealing. The journal article is the most commonly represented in this output subset, accounting for 54.01% of their publications, with 20.54% of output in the form of presentations in congresses. Even though both of these modalities readily lend themselves to co-authorship, our analysis reveals the persistence of individual work. The number of papers signed by the super-producer group of 12 authors is 439, and the number of total authors is 714, which yields a credit/works index of 1.6. Of the 439 papers including super-producer credit, 241 are signed by a single author (54.89%), while only 62 works (14.12%) are signed by three or more (*Table 5*).

Table 5. Distribution of credit/work in papers involving super-producers (≥40)

Author	Number or papers	Number of credits (signatures)	Credit/work index (CWI)	Numbers of credit/works				
				1	2	3	4	5
Beltrán Martínez, Antonio	103	115	1.11	92	10	1	-	-
Mateo Saura, Miguel Ángel	57	82	1.43	38	13	6	-	-
Baldellou Martínez, Vicente	44	79	1.79	29	2	6	7	-
Viñas Vallverdú, Ramón	42	89	2.11	10	19	11	2	-
Alonso Tejada, Ana	37	72	1.94	7	25	5	-	-
Gómez Barrera, Juan Antonio	30	44	1.46	22	5	1	1	1
Grimal Navarro, Alexandre	23	42	1.82	4	19	-	-	-
López Payer, Manuel Gabriel	23	52	2.26	-	17	6	-	-
Soria Lerma, Miguel	23	52	2.26	-	17	6	-	-
Ripoll Perelló, Eduardo	22	23	1.04	21	1	-	-	-
Mas Cornellá, Martí	19	31	1.63	13	3	1	1	1
Hernández Pérez, Mauro Severo	16	33	2.06	5	5	6	-	-
Totals	439	714	-	241	136	49	11	2

An analysis of the production of the 73 most highly productive authors (≥10 publications) does not bring significantly different results. The works bearing a single credit comes to 921, or 49.9% of the subset total output, which is still a substantial proportion. In fact, of these 73 highly productive authors, only seven (9.58%) have worked exclusively in the modality of co-authorship; while another 18 (24.65%) have published less than five works on their own. Another two highly productive authors have done all of their work on their own, while seven others exhibit negligible incidence of co-authorship. At the same time, of the 938 works signed by these highly productive authors, 525 (55.97%) were signed by two authors. As the number authors rises, the number of works diminishes significantly (*Table 6*). The credit/works index (CWI) of the highly productive authors is 1.92, somewhat higher than the 1.54 for the total output.

Table 6. Distribution of credit/work among authors with 10 or more documents

Number of credits	Number of documents	% of co-authorship
2	525	55.97
3	239	25.47
4	104	11.08
5	25	2.66
6	13	1.38
7	10	1.06
8	9	0.95
9	12	1.27
10	0	0
11	1	0.10
Total	938	100

These data appear to contradict the positive effects on output that collaboration exerts in scientific fields (Arora and Pawan, 1995; Agulló Martínez and Aleixandre Benavent, 1999; Beaver and Rosen, 1978, 1979; Pao, 1982). Price (1963), who predicted that by the end of the twentieth century almost all science would be approached collaboratively, coined the term Big Science to define the scientific products of collaboration, distinguishing this modality from what Agulló and Aleixandre (1999) called "artisan" science, which is the "Little Science" of individual inquiry. This indicator suggests the study of post-Paleolithic cave art in Spain has not reached the degree of maturity or professionalization seen in other scientific fields.

The presence of multiple signatures is positively correlated to economic support, in such a way that the scant economic support for research forces researchers to rely on personal initiative (Agulló Martínez and Aleixandre Benavent, 1999). While the field under study has seen an increase in the collaboration rates, attaining percentages 40% in the decade of 1991-2000 and of 41.45% for 2001-2010; these figures do not yet constitute a line of consolidation from which further, steady growth can be expected.

It was only in the years 1999 and 2010 that we see the number of collaborative works surpass those signed by individual authors, the former year coming in at a rate of 50 to 49, and the latter at 18 to 16. In 1997, these modalities were equal at 22 apiece. For all other years in the study period, works signed by single authors outstripped collaborative works by a wide margin. Moreover, the number of works with multiple authors varied widely from year

to year. Between 1991 and 2000, the percentage of scientific collaboration fluctuated from 25% in 1992 and 45.45% in 1994, while in the next decade collaboration increased slightly, coming in at 38.93% in 2006 and 47.05% in 2003. The year 2009 was particularly low in terms of collaboration, reaching a meager rate of 25% of total output for the year. These erratic ups and downs prevent any talk of consolidation of the growth in the modality of collaboration in the field.

International collaboration

Within the subset of the collaborative modality, international collaboration is quite prominent. If the signatures of a foreign authors is taken as a reasonably reliable indicator of the degree of internationalization of the field, our data on the participation of foreign researchers seems to corroborate that the field of post-Paleolithic cave art has not attracted significant interest abroad. Of the 193 works with participating foreign authors, 71 (36.78%) were in collaboration, even though in the general context these works account for only 9.80% of the total collaboration modality subset.

The 71 works published in collaboration include 347 signatures (credits), which yields a credit to work index (CWI) of 1.79, which is somewhat higher than the 1.54 exhibited for collaboration against total output. In terms of signatures, 36 works were signed by two authors (50.70%), while only one (1.40%) was signed by eleven authors.

In the first three decades of the period under study, 14 of the 23 co-authored works (60.86%) included a foreign author. This high proportion can be traced to the preponderance of foreign organizations and individuals in the field of Iberian cave art. In fact, one of the most productive foreign authors and most frequently working in collaboration is Henri Breuil, who signed ten of thirty works in co-authorship with both foreign (Hugo Obermaier, Emil Cartailhac and Mile Burkitt) and Spanish authors (Juan Cabré, Federico de Motos, Pascual Serrano and Juan Bautista Porcar). Between 1931 and 1950 there is a marked decrease in the international co-authorship that parallels a decline in overall output because of the Civil War and subsequent period of isolationism in Spain.

Between 1951 and 1970 international collaboration rebounds slightly, reaching a rate of 35% (7 of 20 works), but then in the decade of 1971 to 1980 it declines again to 2 of 45 works, or 4.44%. Since the early 1980s, co-author-

ship with foreign researchers has seen some modest gains, though the figures come only to 8.63%, i.e., 47 de 544 documents *(Figure 2).*

Of the 71 works coauthored with foreign researchers, 45 (63.38%) are signed by Spanish and foreign authors, while 26 (36.61%) are signed only by foreigners. The highest collaboration index attained by Spanish and foreign researchers has occurred during the last three decades of the study period, touching a rate of 75.50% *(Table 7).*

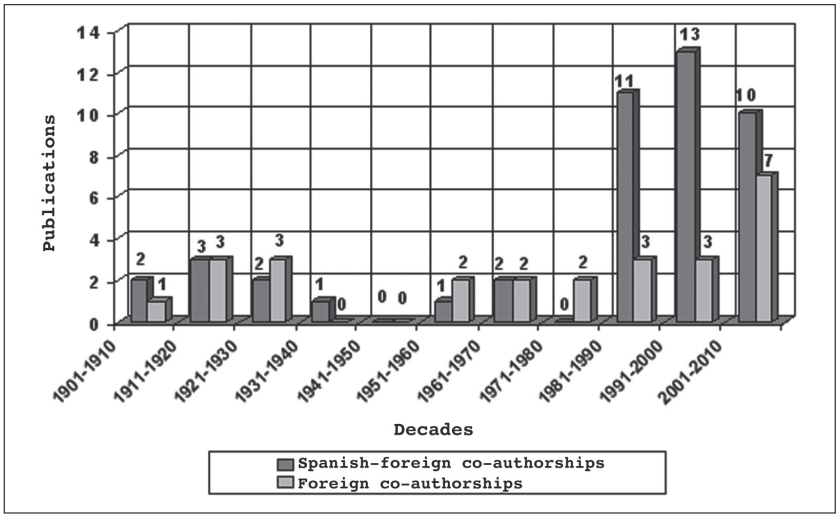

Figure 2. Evolution of co-authorship out involving Spanish and foreign researchers

Table 7. Distribution of international collaboration

Type of co-authorship	Number of works	Number of credits per work										Total credits	CWI
		2	3	4	5	6	7	8	9	10	11		
Spanish-foreign	45	12	12	12	2	2	3	0	1	0	1	171	3,80
Exclusively foreign	26	24	2	0	0	0	0	0	0	0	0	54	2,07

Collaborative groups

Despite some limitation in the approach, the network analysis was performed on the basis of observing the co-authorship network, which can be very useful for identifying collaborative groups (Molina, Muñoz and Doménech, 2002; Russell *et al.*, 2009). These groups may be seen as informal communication networks with some sort of social organization (Pulgarín,

Lagar and Escalona, 2010). In terms of scientific collaboration, these groups may be more or less clearly formed and stable (Carpintero and Peiró, 1981). Moreover, the analysis of collaboration from the standpoint of co-authorship offers the advantage of not knowing about the existence of the group under study. For example, authorship does not reveal institutional affiliation (Zulueta, Cabrero and Bordons, 1999). As such, authorship is a useful tool for making an initial approximation of a definition of any such collaborative groups (Pulgarín, Lagar and Escalona, 2010).

In accord with the criteria discussed in the methodology section, several collaboration groups have been defined, most of which center on a lead, super productive researcher (≥40 publications) (*Table 8*). Of these lead researchers, the following three are most frequently found in collaborative co-authorships: Ana Alonso Tejada, Miguel Soria Lerma and Ramón Viñas Vallverdú. Their collaborative output surpasses their respective sole-author output.

Tabla 8. Grupos de investigación (D., Density; PI, Productivity Index; CWI; credit/WorkIndex

Lead researcher	Number of members	Publications		D	PI	C/WI	No. of credits per work								
		Sole	Co-authorship				1	2	3	4	5	6	7	8	≤9
Viñas Vallverdú, Ramón	40	21	44	0.10	1.62	2.20	21	23	14	5		1		1	
Martínez Valle, Rafael	36	9	29	0.15	1.05	3.02	9	11	7	5	2		1	1	2
Mas Cornellá, Martí	32	36	11	0.20	1.47	2.56	36	3	3	2	1		1		1
Alonso Tejada, Ana	20	19	73	0.17	4.60	1.97	19	61	9	2		1			
Beltrán Martínez, Antonio	18	153	26	0.26	9.94	0.35	153	22	2		1			1	
Baldellou Martínez, Vicente	16	40	20	0.32	3.75	1.83	40	3	7	9			1		
Gómez-Barrera, Juan Antonio	14	35	9	0.30	3.14	1.38	35	5	1	2	1				
Collado Giraldo, Hipólito	11	22	3	0.40	2.18	1.45	22	2	1						
Hernández Pérez, Mauro Severo	11	25	23	0.30	4.36	1.79	25	10	12		1				

Breuil, Henri	10	20	10	0.46	3	1.43	20	7	3					
Mateo Saura, Miguel Ángel	9	53	40	0.36	10.33	1.55	53	28	12					
Soria Lerma, Miguel	9	3	37	0.44	4.77	2.16	3	26	10	1				

Three of the twelve research groups identified begin collaborating in the late 1970s. These groups are headed by Ana Alonso Tejeda, Vicente Baldellou Martínez and Ramón Viñas Vallverdú. Another four groups are launched in the 1980s, led by Juan Antonio Gómez-Barrera, Mauro Severo Hernández Pérez, Martí Mas Cornellá and Miguel Soria Lerma, while three others, led by Hipólito Collado Giraldo, Rafael Martínez Valle, and Miguel Ángel Mateo Saura, get their start in the 1990s. Over the first twenty years of the period under study, we were only able to identify the existence of one research group, that led by Henri Breuil. In the 1950s, Antonio Beltrán Martínez headed another of these work teams. The groups headed by Breuil and Beltrán Martínez were almost always made up of occasional collaborators, of which only one appears as a lead authors of a single work. This manner of collaboration is quite common across all of the research groups identified. The output of these collaborative groups comes to 761 documents, which is 34.81% of the total sample output.

An analysis of the research groups identified and their scientific output reveals that there is no positive correlation between the number of members of a group and the number of works it publishes. The groups with most members do not necessarily publish the most; while the largest group (with 40 members) published 65 works, we have three other groups with less than half these members with nearly twice the number of publications.

The fact that there is no positive correlation between number of members in a group and the number of publication is mediated by the specific weight of output signed only by the lead authors of these groups (*Figure 3*).

In terms of cohesion, the low density exhibited in all of these groups indicates that collaboration among authors diminishes as group size increases in such a way that density is highest when groups have fewer members. In our study, groups with nine members exhibited the highest degree of cohesion.

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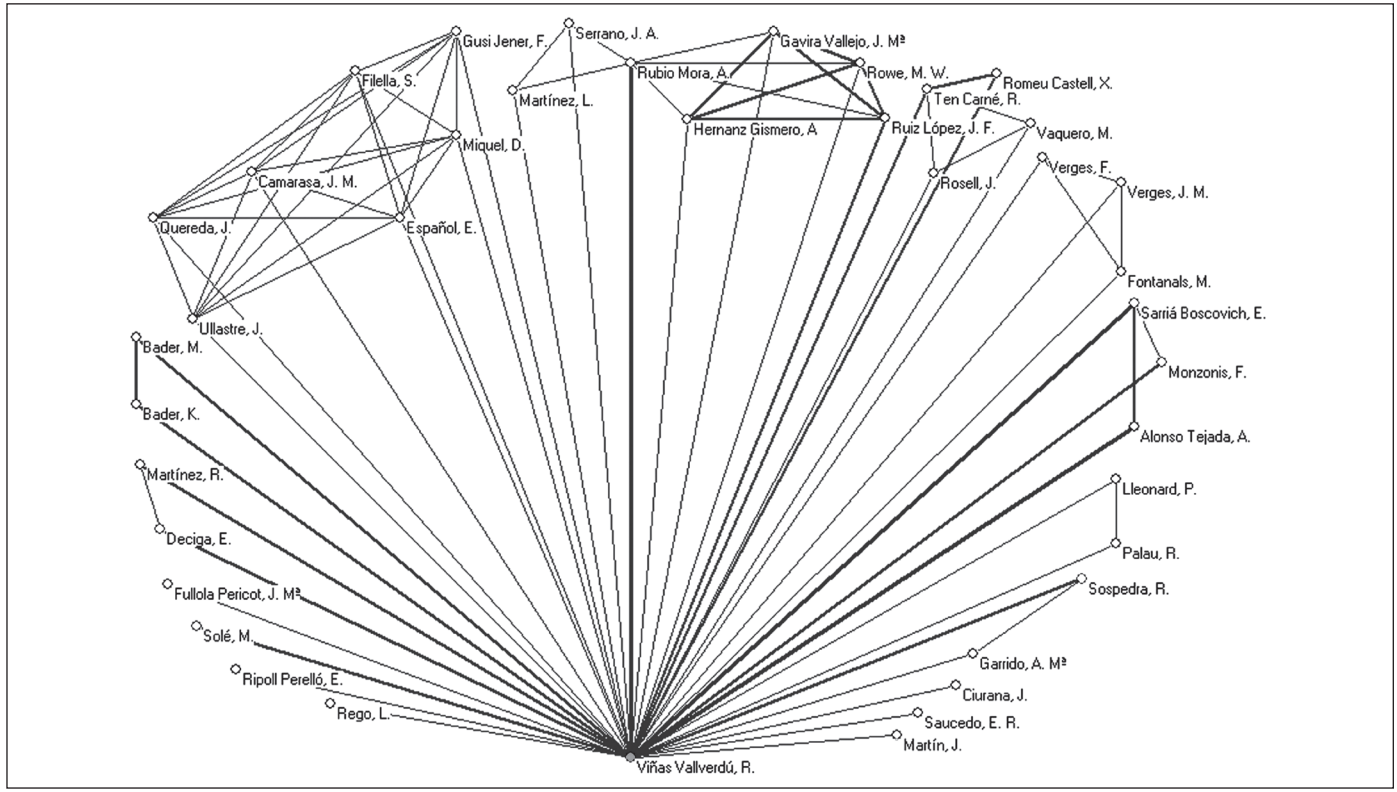

Figure 3. Collaborative group of Ramón Viñas Vallverdú

Conclusions

While the analysis of scientific output in the field of post-Paleolithic cave art in Spain for the period 1907-2010 reveals marked features of localism and meager international reach (Mateo Saura, 2013), the study of authorship may show the way toward its maturation as a science.

In the first place, the traditional tendency for individual work must move toward a collaborative, interdisciplinary approach. As stated by Cruz Berrocal *et al.* (1999) in an earlier work, this personal approach has been a hallmark of research in prehistoric and Levantine art since its very early days. While the prevalence of co-authorship in such fields has begun to grow since the middle of the period under study, reaching as much 42% of output over the last decade studied, fully 64.64% of this collaboration is comprised of works signed by two authors; while 5.80% of these works bear five or more credits.

The research team approach offers several advantages, including cost sharing, broadened access to resources and enhanced visibility. In our view, without interdisciplinary teamwork an exhaustive study and understanding of cave art cannot at this time be achieved. For a long time, the study of cave art was largely circumscribed to descriptive analysis of the iconography, something performed by an individual, usually a specialist in prehistory. Newer outlooks on prehistoric art, however, go beyond questions of iconography and demand the application of techniques from other scientific fields. A true understanding of cave art in all its facets will require the formation of interdisciplinary teams.

In the last several years several interdisciplinary works have in fact been published. Nonetheless, our data for the last two decades of the period under study show that individual authorship still accounts for 60% of output. In this light, the output of the 12 super producers is quite revealing. The output of these authors is 813 works, which is 37.19% of total sample output. Of these works 429 documents (52.77%) are signed by a single author. In view of the data, we cannot categorically safely assert that the field is undergoing a process of consolidation, as most output continues to be achieved by individuals.

In conjunction with this individual bent, we observe that there are, even today, many individuals publishing who are not associated with any academic or administrative institution. Of the 12 super producers identified (≥40 publications), only four are ascribed to a university and one to a museum. Since such institutions provide funding and material support for research, we might well think that these independent researchers are either securing support from external sources or they are approaching the field as aficionados, something which might raise, in the strictest sense, questions about their degree of professionalism. Nonetheless, it is quite clear that the study of cave art in Spain owes an incalculable debt to these inquiring individuals. In this light, researchers specializing in cave art should make every effort to join institutions in charge of the field; and the institutions themselves should reach out to this community of researchers, while encouraging the formation of interdisciplinary research groups to study the nature of cave art more fully.

Works cited

Abad Pérez, I. (1987), "La aportación de la Comunidad Valenciana a la ciencia médica (1980-1984)." PhD diss., Valencia: Facultad de Medicina, Universitat de València.

Agulló Martínez, A. (1998), "Estudio bibliométrico de las publicaciones médicas españolas analizadas en el Índice Médico Español (1989-1991)." PhD diss., Valencia: Departamento de Historia de la Ciencia y Docuentación, Universitat de València.

Agulló Martínez, A., and Aleixandre Benavent, R. (1999), "Evolución del índice de colaboración de los artículos médicos españoles en la presente centuria." *Papeles Médicos* 8: 16-20.

Alonso Arroyo, A.; Pulgarín Guerrero, A., and Gil Leiva, I. (2005), "Estudio cienciométrico de la colaboración científica en la Universidad Politécnica de Valencia, España." *Información Research* 11 (1), paper 245. Accessed February 20, 2011. http://InformationR.net/ir/11-1/paper245.html

Álvarez-Solar, M.; López-González, M. L. and Cueto-Espinar, A. (1998), "Indicadores bibliométricos, análisis temático y metodológico de la investigación pública en España sobre epidemiología y salud pública." *Medicina Clínica* 111 (14): 529-535.

Armada, X. L. (2009), "Indicadores bibliométricos, visibilidad y calidad de revistas científicas: en torno a Revista d'Arqueologia de Ponent." *Revista d'Arqueologia de Ponent* 19: 7-28.

Arora, J., and Pawan, U. (1995), "Collaborative research and authorship patterns in immunology: correlation between multiple authorship citednees." *Iaslic Bulletin* 40 (2): 73-83.

Batagelj, V., and Mrvar, A. (2007), *Pajek software.* Accessed June 24, 2014. http://pajek.imfm.si/doku.php

Beaver, D. de B., and Rosen, R. (1978), "Studies in scientific collaboration I. The professional origins of scientific co-authorship." *Scientometrics* 1 (1): 527-538.

Beaver, D. de B., and Rosen, R. (1979), "Studies in scientific collaboration II. Professionalizaction and the natural history of modern scientific co-authorship." *Scientometrics* 1 (3): 231-245.

Bordons, M., and Gómez, I. (1997), "La actividad científica española a través de indicadores bibliométricos en el periodo 1990-1993)." *Revista General de Información y Documentación* 7 (2): 69-86.

Bordons, M., and Zulueta, Ma. A. (1999), "Evaluación de la actividad científica a través de los indicadores bibliométricos." *Revista Española de Cardiología* 52: 790-800.

Bordons, M.; Zulueta, Ma. A.; Cabrero, A., and Barrigón, S. (1995), "Identifying research teams with bibliometric tools." In *Proceedings of the Fifth Biennial Conference of the International Society for Scientometrics and Informetrics*, edited by M. E. Koening and A. Brookstein, 83-92. Medford: Learnes Information.

Carpintero, H., and Peiró, J. M. (1981), *Psicología Contemporánea. Teoría y métodos cuantitativos para el estudio de su literatura científica.* Valencia: Alfaplús.

Crane, D. (1972), *Invisible colleges. Diffusion of Knowledge in scientific communities*. Chicago: The Chicago University Press.

Cronin, B.; Shaw, D., and La Barre, K. (2003), "A cast of thousands: coauthorship and subathorship collaboration in the 20th century as manifested in the scholarly journal literature of psychology and philosophy." *Journal of the American Society for Information Science and Technology* 54 (9): 855-871.

Cruells, W. (1995), "Aproximació bibliomètrica i indexs de Cota Zero (1985-1995)." *Cota Zero* 11: 100-122.

Cruz Berrocal, M.; Goytre Samaniego, J.; Leal Valladares, J. G., and López Domínguez, M. (1999), "Crítica al estudio del arte rupestre levantino desde una perspectiva bibliométrica." *Trabajos de Prehistoria* 56 (1): 53-75.

García del Toro, M. A.; García Abolló, J. L.; Juárez Pérez, M., and López Guerao, M. A. (1999), "Estudio bibliométrico de la revista Archivo Español de Arqueología: foro nacional de investigación arqueológica." *Actas del XXIV Congreso Nacional de Arqueología*, Cartagena, 1997, 329-339.

García Heras, M. (1997), "Estudio bibliométrico de los trabajos de caracterización sobre materiales cerámicos arqueológicos en España: una valoración." *Revista d'Arqueologia de Ponent* 7: 129-150.

García Marín, A.; Rodríguez Alcalde, A. L.; San Millán Bujanda, M. J.; Vicente Bobadilla, G. de, and Martínez Navarrete, M. I. (1997), "¿Nos pasamos de la raya?: la frontera hispano-portuguesa a través de las publicaciones de Prehistoria y Protohistoria." *Trabajos de Prehistoria* 54 (1): 35-56.

García Marín, A., and Román Román, A. (1998), "Las publicaciones periódicas de Historia Antigua, Prehistoria y Arqueología: difusión internacional." *Trabajos de Prehistoria* 55 (1): 139-146.

González de Dios, J.; Moya, M., and Mateos, M. A. (1997), "Indicadores bibliométricos: características y limitaciones en el análisis de la actividad científica." *Anales Españoles de Pediatría* 47: 235-244.

Hernanz Gismero, A., and Ruiz López, J. F. (2012), "Estudio espectroscópico μ-Raman de pigmentos del Abrigo Riquelme." In *Las pinturas rupestres esquemáticas del Abrigo Riquelme. Jumilla, Murcia*, 151-154. Murcia: Dirección General de Bienes Culturales. (Monografías del Centro de Estudios de Prehistoria y Arte Rupestre, 2.)

Lawani, S. M. (1986), "Some bibliometric correlatos of quality in scientific research." *Scientometrics* 9: 13-25.

López Piñero, J. M., and Terrada, M. L. (1992), "Los indicadores bibliométricos y la evaluación de la actividad médico-científica (III). Los indicadores de producción, circulación, dispersión, consumo de la información y repercusión." *Medicina Clínica (Barcelona)* 98 (4): 142-148.

Lotka, A. J. (1926), "The frecuency distribution of scientific productivity." *Journal Washington Academy Science* 16 (12): 317-323.

Maltrás Barba, B. (2003), *Los indicadores bibliométricos. Fundamentos y aplicación al análisis de la ciencia.* Gijón: Trea.

Martínez Fernández, M. (1996), "Análisis bibliométrico de la producción científica sobre radiodiagnóstico a través de la revista Radiología (1984-1993)." PhD diss., Murcia: Facultad de Medicina, Universidad de Murcia.

Mateo Saura, M. A. (1992), *Arte naturalista en Murcia. Aspectos socioeconómicos y etnográficos,* thesis. Murcia: Facultad de Letras, Universidad de Murcia.

Mateo Saura, M. A. (2001), "Arte levantino *adversus* pintura esquemática. Puntos de encuentro y divergencias entre dos horizontes culturales de la Prehistoria peninsular." *Quaderns de Prehistòria i Arqueología de Castelló* 22: 183-211.

—— (2009), *Arte rupestre levantino. Cuestiones de cronología y adscripción cultural.* Murcia: Tabularium.

—— (2013), "Análisis bibliométrico de la producción científica sobre la pintura rupestre postpaleolítica en España. Arte levantino y pintura esquemática (1907-2010)." PhD diss., Murcia: Departamento de Prehistoria, Arqueología, Historia Antigua, Historia Medieval y Ciencias y Técnicas Historiográficas, Universidad de Murcia.

Merton R. K. (1968), "The Matthew effect in science." *Science* 199: 55-63.

Miguel Dasit, A. (2003), "Estudio bibliométrico de las publicaciones españolas sobre diagnóstico por la imagen (1994-1998)." PhD diss., Valencia: Universitat de València.

Molina, J. K.; Muñoz, J. M., and Doménech, M. (2002), "Redes de publicaciones científicas: un análisis de la estructura de coautorías." *Redes. Revista Hispana para el Análisis de Redes Sociales* 1 (3), Barcelona. Accessed October 24, 2011. http://revista-redes.rediris.es/html-vol1/vol1_3.htm

Montes Bernárdez, R., and Cabrera Garrido, J. A. (1992), "Estudio estratigráfico y componentes pictóricos del arte prehistórico de Murcia (Sureste de España)." *Anales de Prehistoria y Arqueología* 7-8: 60-74.

Nicholls, P. T. (1986), "Empirical validation of Lotka's law." *Information Processing and Management* 22 (5): 417-419.

Osca Lluch, J., and Mateo Marquina, Ma. E. (2003), "Difusión de las revistas españolas de ciencias sociales y humanidades. Acercamiento bibliométrico." *Revista General de Información y Documentación* 13 (1): 115-132.

Otte, E., and Rousseau, R. (2002), "Social networks analysis: a powerful strategy, also for the information sciences." *Journal of Information Science* 28 (6): 441-453.

Over, R. (1982), "Collaborative research and publication in psychology." *American Psychology* 37: 996-1001.

Pao, M. L. (1982), "Collaboration in computacion musicology." *Journal of the American Society for Information Science* 33 (1): 38-41.

—— (1985), "Lotka's law: a testing procedure." *Information Processing & Management* 21 (6): 305-320.

—— (1986), "An empirical examination of Lotka's law." *Journal of the American Society for Information Science* 37 (1): 26-33.

Price, D. J. de Solla (1963), *Big Science, Little Science.* New York: Columbia University Press.

Price, D. J. de Solla, and Gürsey, S. (1976), "Studies in scientometrics: Part I: Transcience and continuance in scientific authorship." *Internationalt Forum on Information and Documentation* 1: 17-24.

Pulgarín, A.; González-Calatrava, I.; Escalona-Fernández, I., and Pérez-Pulido, M. (2003), *Estudio bibliométrico de la producción científica y tecnológica de la Universidad de Extremadura: análisis de la difusión alcanzada en bases de datos internacionales. Periodo 1991-2000.* Cáceres: Universidad de Extremadura.

Pulgarín, A.; González-Calatrava, I.; Escalona-Fernández, I., and Pérez-Pulido, M. (2004), *Estudio bibliométrico de la producción científica de la Universidad de Extremadura: análisis de la difusión alcanzada en bases de datos nacionales. Periodo 1974-2001.* Cáceres: Universidad de Extremadura.

Pulgarín, A.; Lagar, Ma. P., and Escalona, Ma. I. (2010), "Colaboración científica de la ingeniería química en las universidades españolas." *Revista General de Información y Documentación* 20: 101-113.

Raisig, L. M. (1960), "Mathematical evaluation of the scientific serial." *Science* 131: 1417-1419.

Ripoll Perelló, E. (1961), "Los abrigos pintados de los alrededores de Santolea, Teruel." In *Monografías de Arte Rupestre. Arte Levantino*, 1. Barcelona: Instituto de Prehistoria y Arqueología de la Diputación Provincial de Barcelona, Werner Gren Foundation for Anthropological Research.

Rodríguez Alcalde, A. L.; San Millán Bujanda, Ma. J.; Sánchez Nistal, J. M., and Chapa Brunet, Ma. T. (1993), "Análisis bibliométrico de Trabajos de Prehistoria: un chequeo a la Prehistoria española de las tres últimas décadas." *Trabajos de Prehistoria* 50: 11-37.

Rodríguez Alcalde, A. L.; Sánchez Nistal, J. M.; Martínez Navarrete, Ma. I., and San Millán Bujanda, Ma. J. (1996), "Análisis bibliométrico de las revistas españolas de Prehistoria y Arqueología en los últimos diez años." *Trabajos de Prehistoria* 53: 37-58.

Roldán García, C. (2009), "Análisis de pigmentos en conjuntos de arte rupestre." In *Actas del IV Congreso El arte rupestre del Arco Mediterráneo de la Península Ibérica*, 269-277. Valencia: Instituto Alicantino de Cultura Juan Gil-Albert de la Diputación Provincial de Alicante.

—— (2012), "Contribución de los análisis físico-químicos a la caraterización y conservación del arte rupestre en entornos abiertos." *Jornadas Técnicas para la gestión del arte rupestre, Patrimonio Mundial,* Alquezar, Huesca, Comarca del Somontano y Ministerio de Educación, Cultura y Deporte, 129-136.

Rovira Llorens, S. (1994), "Estudio bibliométrico del Boletín de la Asociación de Amigos de la Arqueología." *Boletín de la Asociación de Amigos de la Arqueología* 34: 57-65.

Russell, J. M.; Madera Jaramillo, Ma. J., and Ainsworth, S. (2009), "El análisis de redes en el estudio de la colaboración científica." *Redes. Revista hispana para el análisis de redes sociales* 17 (2). Accessed September 14, 2011. http://revista-redes.rediris.es/html-vol17/vol17_2.htm

Sancho, R. (1990), "Indicadores bibliométricos utilizados en la evaluación de la ciencia y la tecnología. Revisión bibliográfica." *Revista Española de Documentación Científica* 13 (3-4): 842-865.

Shubert, A., and Glänzel, W. (1991), "Publication dynamics: model and indicators." *Scientometrics* 20 (1): 317-331.

Terrada, M. L. (1971), "España en el panorama internacional de las publicaciones médicas." *Médula Espinal* 66: 191-198.

—— (1973), "El 'impacto' internacional de la literatura médica española contemporánea: índice de visibilidad de Platz." *Médula Espinal* 70: 239-244.

Valderrama, J. C.; González, G.; Valderrama, F. J.; Aleixandre, R., and Miguel, A. (2007), "Redes de coautorías y colaboración institucional en Revista Española de Cardiología." *Revista Española de Cardiología* 60 (2): 117-130.

Valenciano, J.; Devís, J.; Villamón, M., and Peiró, C. (2010), "La colaboración científica en el campo de las Ciencias de la Actividad Física y el Deporte en España." *Revista Española de Documentación Científica* 33 (1): 90-105.

Zulueta, Ma. A.; Cabrero, A., and Bordons, M. (1999), "Identificación y estudio de grupos de investigación a través de indicadores bibliométricos." *Revista Española de Documentación Científica* 23 (3): 333-347.

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Diagnosis of Information Science Informational literacy from the perspective of the student of the University of Havana

Marlery Sánchez Díaz *

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Abstract

The Information Society of today requires students to access, analyze, evaluate and use information properly. To this end, students need to acquire competencies associated with search, evaluation, processing and communication of information. These competencies are especially important in information professionals, who are charged with the task of matching information resources with information needs. This implies the ability to identify needs and resources, and organize and represent information to the satisfaction of users. Using the ALFIN-HUMASS self-assessment questionnaire, students' perceptions of motivation and self-efficacy were studied in terms of the competencies associated with four overarching informational categories: Search, Evaluation, Processing and Communication.

* Universidad de la Habana, Cuba. infctf@biocen.cu

Moreover, the study examines the learning contexts of self-guided or independent learning, library work, coursework and classrooms. The study offers a reflection on the degree of importance students lend to informational competencies and their perceived degree of expertise, while also drawing some conclusion about learning needs.

Keywords: Information competencies; Information sciences.

Resumen

Diagnóstico de las competencias informacionales en Ciencias de la Información desde la percepción del estudiante de la Universidad de la Habana

Marlery Sánchez-Díaz

En la actual sociedad de la información es importante saber acceder, analizar, evaluar y utilizar la información adecuadamente; para ello son necesarias las competencias relacionadas con la búsqueda, la evaluación, el tratamiento y la comunicación de la información. Estas competencias se hacen aún más importantes para los profesionales de la información, pues son quienes deben lograr la correspondencia entre los recursos y los requerimientos de información, lo que implica la identificación de necesidades y recursos, la representación y organización de la información y la satisfacción de los destinatarios. Tomando como referencia el cuestionario ALFIN-HUMASS, en el presente trabajo se estudian la motivación y la autoeficacia en cuanto a las competencias relacionadas con la información de los estudiantes de la titulación de Ciencias de la Información de la Universidad de la Habana, especialmente en cuatro categorías (búsqueda, evaluación, tratamiento y comunicación de información), desde la autoevaluación; se analizan además los entornos de aprendizaje a partir de criterios como la biblioteca, individual o autodidacta, cursos o clases. Se reflexiona acerca de la importancia que dan estos estudiantes a las competencias informacionales y su nivel de destreza, así como también las necesidades de aprendizaje.

Palabras clave: Competencias informacionales; Ciencias de la Información.

Introduction

The new society in which the use and generation of information is increasingly important, information professionals with specialized knowledge of informatics technologies will become key agents.

> This information will serve as an indispensable bridge between suppliers and users of information. This bridge is undergirded by the new information and communications technologies and it stands within a complex world of competencies. […] The changing circumstances of labor markets require these information professionals to develop new and often disparate competencies […] which are, in terms of academics, essential to the institutions that train them as well as to the professionals themselves. (Sánchez and Vega, 2004. Translated from Spanish)

The information and knowledge society requires information professionals to be competent in information.

> Librarians must have their own kind of literacy or 'Information Competency,' i.e., they must have mastery of the concepts of the information world, its procedures and values in order to performs contextualized, reflective and intentional selections, assessments and integrations of information for its subsequent ethical use and communication. […] With regard to informational competence itself: even though it must be continuously renewed in the current technological and scientific context, it is usually understood as a given and inherent to professional practice […]. (Gómez-Hernández, 2009: 107. Translated from Spanish)

Moreover, it is the professional who must acquire informational competencies at the level of the entire society, taking into account the concept of life-long training and learning that embraces ongoing professional, academic, social and cultural appraisals of broad range of informational competencies. This issue has become increasingly relevant in university level teaching, because the knowledge, abilities and attitudes associated with information developed during one's university training are what allows a the professional to compete in the labor market. Higher education, as understood by Pinto, Doucet and Fernández-Ramos (2008), should respond to this new demand, while stressing that these competencies go beyond bibliographic instruction and use of technology. The approach should include matters of analytic and critical thinking, as well as the development of problem solving skills.

Information Science (IS) as a field of study is charged with producing professionals capable of resolving the conundrum posed by accessibility versus availability of information resources and the needs, expressed or other-

wise, for information and training of diverse persons or social groups. This professional is tasked with matching information resources to needs. This implies identifying needs and resources, and their proper representation and organization in order to satisfy the needs of the user.

There is a broad literature on matters of informational literacy in higher education; however, not much has been published on questions of informational competency of IS students. In Cuba Quindemil (2010) has proposed an educational approach to facilitate the introduction of ALFIN in the ongoing IS education model and "C" curriculum developed in the Universidad Agraria de la Habana. Meneses-Placeres and Frías-Guzmán (2011) examine the presence of ALFIN postulates in the training of information professionals through a curriculum design and characterize the insertion of ALFIN in the "D" curriculum of the IS faculty at the Universidad Central "Marta Abreu" of Las Villas.

As for the Universidad de la Habana, an exploratory study on information competency of students, which included IS students (González, Sánchez and Lezcano, 2012) exists, but it does not provide a specific analysis of these students. Consequently, the main objective of this paper it to offer a diagnosis of the impression students in the Universidad de la Habana have of IS, while also examining their motivations and degree of mastery of information competency, as well as how they go about acquiring the same.

Theoretical framework

Informational competencies exist insofar as they are the practice of mobilizing and combining the skills, knowledge and attitudes, and transferring these across an array of contexts, in order to solve problems and learn to learn; regardless of the type, format and support of the information resource. Such competencies are required in any area and include other competencies such as technological skills, librarianship, critical thinking skills and social abilities (Sánchez, 2008b). "In order to achieve a high degree of expertise, […] this deployment of information competencies occurs in several stages: identification, standardization, evaluation, development and certification" (Sánchez, 2008a).

The identification and standardization of informational competencies has been performed through diverse model and standards, including the

Normas sobre aptitudes para el acceso y uso de la información en la educación superior of the Association of College and Research Libraries (ACRL/ALA, 2000). The development of competencies in the informational perspective consists of the teaching-learning process that facilitates the acquisition of informational competencies at the desired level. The ways by which competencies are acquired lie within the framework of the formal system (previous training, initial and basic, before active life and outside of the work context) outside or within the curriculum as a specific class or part of a subject area. It also occurs in the extra-formal system (ongoing education, on-the-job training and during active life); and in the informal system (experience and actual professional practice) (Sánchez, 2010b).

The evaluation of informational competencies is the process of verification of evidence of performance associated with the information of an individual against a defined standard. This can be a diagnosis, when it serves to identify the training needs. It can also be a result when it allows certification of these competences (Sánchez, 2010a). The literature in the field presents several projects and initiatives for evaluating information competencies, including:

> SAILS *Standardized Assessment of Information Literacy Skills,* ETS/ICT-*Educational Testing Service/Information and Communications Technology*, *Bay Area Community College Information Competency Assessment Project,* ISST-*Information-Seeking Skills Test*, TRAILS-*Tool for Real-time Assessment of Information Literacy Skills*, *Information Skills Survey* (ISS) *for Assessment of Information Literacy in Higher Education, European Network on Information Literacy for a Culture of Information* ENIL. (Sánchez, 2012: 55)

ALFIN-HUMASS is a tool designed with a focus on attitude and specifically for graduation assessments in Sociology and the Humanities.

Metodology

To gather data, this study uses the ALFIN-HUMASS questionnaire. The study is limited geographically to Cuba and focuses specifically on students enrolled in Information Science of the Universidad de la Habana. The study was carried out in two stages. The first stage consisted of gathering data during the 2011-2012 academic year and the second consisted of performing the descriptive analysis of these data. The sample consisted of 146, most of which were first-year students (*Table 1*).

Table 1. Subjects in the study

Academic year	Number of students
First year	55
Second year	39
Third year	29
Fourth year	23
Total	146

A hard copy of the questionnaire was handed out to students in classrooms of the Faculty of Communication over the course of three consecutive days. Each group of students surveyed first received a short explanation of the survey and the objectives of ALFIN-HUMASS. Instructions were provided to the students by the researcher in order to prevent bias, and responses were completely anonymous.

The ALFIN-HUMASS[1] questionnaire is comprised of 26 items (Pinto and Lopes, 2010) grouped in four categories or large transversal competencies:

1. Search (items 1-8): 1- Knowing how to use printed information sources; 2- Knowing how to access and use automated catalogues; 3- Knowing how to consult and use electronic sources of primary information; 4- Knowing how to consult and use electronic sources of secondary information (e.g., databases); 5- Knowing the terminology of one's field; 6- Knowing how to search and retrieve information on the internet (advanced searches, directories, portals); 7- Knowing how to use informal electronic sources of information (e.g., blogs, distribution lists); 8- Knowing informational search strategies (descriptors, Boolean operators).
2. Evaluation (items 9-13): 9- Knowing how to assess the quality of the information resources; 10- Recognize the author's ideas in the text; 11- Knowing the typology of the sources of scientific information (e.g., Thesis); 12- Being able to determine if an information resource is updated; 13- Knowing the most relevant authors or institutions in you field of inquiry.

1 The original ALFIN-HUMASS Spanish-language instrument can be consulted at: http://www.mariapinto.es/alfin-humass/

3. Processing (items 14-19): 14- Knowing how to summarize and outline information: 15- Being able to recognize the structure of a text; 16- Knowing how to use database managers (e.g., Access, MySQL); 17- Knowing how to use bibliographic reference managers (e.g., EndNote); 18- Knowing how to manage statistical programs and spread sheets (e.g., Excel) 19- Knowing how to install informatics programs.
4. Communication (items 20-26): 20- Knowing how to communicate in public; 21- Knowing how to communicate in other languages; 22- Knowing how to draft a documents (e.g., report, academic work); 23- Knowing the ethical code of one's academic/professional field; 24- Knowing the laws regulating the use of information and intellectual property; 25- Knowing how to make academic presentations (e.g., Power Point); 26- Knowing how to disseminate information on the internet (e.g., Webs, blogs,…).

In this sense, each of these items is framed in three dimensions:

1. Motivation or importance (subjective and quantitative)
2. Auto-efficacy or degree of acquisition (subjective and quantitative)
3. Sources, modalities or habits of learning (qualitative)

In the quantitative dimensions, students had to respond to a Likert scale with values of 1 to 9, where 1 was the lowest and 9 the highest. In the qualitative dimension, students indicated, as warranted for each variable, traditional classroom, library, individual work or specialized courses. The data were gathered in Microsoft Excel and the analysis was performed SPSS 15.0 informatics software. In the subjective and quantitative dimensions (motivation and self-efficacy), the central tendency is determined as the average and the dispersion of data with the standard deviation. The extreme, atypical values of items were determined in order to discover strong and weak points. Moreover, the central tendency, dispersion, outliers and atypical items in each category were assessed against motivation and self-efficacy.

Given the number and diversity of the student sample, comparisons are made on the basis of their grade levels. By means of the frequency, we attempt to identify the main sources of learning used by the surveyed population.

To ascertain the reliability of the instrument the Cronbach alfa coefficient is employed. Internal consistency of the instrument was found to be

quite high (See *Table 2*). In this light, the survey instrument may be deemed reliable. Variations in the responses to survey in fact reflect real differences in opinion and are not caused by faulty or confusing items.

Table 2. Reliability analyses of survey questionnaire

Reliability Analysis-Scale (Alpha)	
Reliability Coefficients	
N of Cases = 146,0	N of Items = 52
Alpha = ,9369	

The external validity of the ALFIN-HUMASS instrument is clearly evident. Its parts, scales and procedures can be generalized and are applicable to the population in general. Moreover, it is transferable and applicable to other similar contexts. Of a total of 146 cases, 100% were validated.

Results and discussion

The results appearing in the last row of *Table 3* reveal an overall average higher for motivation (8.26) than that for self-efficacy (6.31). The difference between these overall averages is 1.95. In contrast, the standard deviation was lower for motivation (1.524) than for self-efficacy (2.318). All told, the average scores were higher and more concentrated in assessments of motivation and lower and more dispersed in assessments of self-efficacy.

In general there were ten items that attained higher average scores for motivation and self-efficacy and lower deviations (*Table 3*):

1. Knowing how to use printed information sources
3. Knowing how to consult and use electronic sources of primary information
5. Knowing the terminology of one's field
9. Knowing how to evaluate the quality of information sources
10. Recognize the author's ideas in the text
12. Being able to determine if an information resource is updated
14. Knowing how to summarize and outline information
20. Knowing how to communicate in public

22. Knowing how to draft a document (e.g., report, academic paper)
25. Knowing how to make academic presentations (e.g., Power Point)

Among these items, numbers 22 and 25 (Knowing how to draft a document and Knowing how to make academic presentations, respectively) stand out positively; because they have among the five highest average scores and the five lowest deviations. This observation is applicable to both motivation and self-efficacy. There were also nine items with the lowest average scores and the highest deviations in both motivation and self-efficacy (*Table 3*). These were as follows:

4. Knowing how to consult and use electronic sources of secondary information (e.g., databases)
7. Knowing how to use informal electronic sources of information (e.g., blogs, distribution lists)
8. Knowing informational search strategies (descriptors, Boolean operators)
16. Knowing how to use database managers (e.g., Access)
17. Knowing how to use bibliographic reference managers (e.g., EndNote)
18. Knowing how to manage statistical programs and spread sheets (e.g., Excel)
19. Knowing how to install informatics programs
24. Knowing the laws regulating the use of information and intellectual property
26. Knowing how to disseminate information on the internet (e.g., Webs blogs)

Among these items, number 17 (Knowing how to use bibliographic reference managers) is the most negative, because it is among the five lowest average scores and five highest deviations. This observation is applicable to both motivation and self-efficacy, making it in the minds of students the least important and least acquired.

Table 3. Averages and deviations of the items N=146

	Items	Motivation		Self-efficacy	
		Mean	Standard Deviation	Mean	Standard Deviation
1.	Knowing how to use printed information sources	8,39	1,285	7,55	1,799

2.	Knowing how to access and use automated catalogues	8,13	1,472	5,73	2,431
3.	Knowing how to consult and use electronic sources of primary information	8,41	1,354	6,88	2,144
4.	Knowing how to consult and use electronic sources of secondary information (e.g., databases)	8,12	1,686	6,24	2,371
5.	Knowing the terminology of one's field	8,60	1,214	6,89	1,799
6.	Knowing how to search and retrieve information on the internet (advanced searches, directories, portals)	8,42	1,579	6,34	2,544
7.	Knowing how to use informal electronic sources of information (e.g., blogs, distribution lists)	7,66	1,882	5,48	2,570
8.	Knowing informational search strategies (descriptors, Boolean operators)	8,04	1,890	5,44	2,966
9.	Knowing how to assess the quality of the information resources	8,38	1,430	6,35	2,033
10.	Recognize the author's ideas in the text	8,30	1,367	7,39	1,837
11.	Knowing the typology of the sources of scientific information (e.g., Thesis)	8,29	1,172	7,28	1,975
12.	Being able to determine if an information resource is updated	8,44	1,245	6,53	2,088
13.	Knowing the most relevant authors or institutions in you field of inquiry	8,35	1,625	6,22	2,389
14.	Knowing how to summarize and outline information	8,40	1,465	6,82	2,126
15.	Being able to recognize the structure of a text	8,01	1,686	6,65	2,138
16.	Knowing how to use database managers (e.g., Access)	8,10	1,604	5,03	2,613
17.	Knowing how to use bibliographic reference managers (e.g., EndNote)	7,99	1,974	5,35	2,954
18.	Knowing how to manage statistical programs and spread sheets (e.g., Excel)	8,01	1,738	5,91	2,682
19.	Knowing how to install informatics programs	7,86	2,019	5,88	3,022
20.	Knowing how to communicate in public	8,57	1,250	6,93	1,934
21.	Knowing how to communicate in other languages	8,45	1,391	4,95	2,597
22.	Knowing how to draft a documents (e.g., report, academic work);	8,71	0,868	7,31	1,678

23.	Knowing the ethical code of one's academic/professional field	8,24	1,838	6,64	2,293
24.	Knowing the laws regulating the use of information and intellectual property	8,07	1,933	5,30	2,547
25.	Knowing how to make academic presentations (e.g., Power Point)	8,59	0,809	7,83	1,734
26.	Knowing how to disseminate information on the internet (e.g., Webs, blogs,…)	8,22	1,861	5,21	3,010
		8,26	1,524	6,31	2,318

A pair analysis of the relationship between motivation and self-efficacy demonstrates that the differences in the averages, falling between 1 and 3, are significant (*Table 4*). Scores below 1 were observed in variables 1, 10 and 25 (Knowing how to use printed information sources, Recognizing the author's ideas in the text and Knowing how to make academic presentations, respectively). Both of these items yielded high motivation and self-efficacy scores. Scores above 3 were observed in pair 16 and 26 (Knowing how to use database managers (e.g., Access) and (Knowing how to disseminate information on the internet (e.g., Webs, blogs). These items yielded high average motivation and low self-efficacy, suggesting there is room for improvement.

The highest values for difference in standard deviation reflect lower levels of training, something that should be addressed. Those items where differences came in above 2 are the areas requiring improvement (*Table 4*). The Pearson coefficient s(r) shown in *Table 4* suggests a correlation between motivation and self-efficacy. As motivation increases, self-efficacy also does to some degree. It seems that greater students' perception of their degree of expertise in a given competency, the greater importance they lend that competency. It is very likely that when training in a given competency is given greater emphasis with concomitant greater degree of acquired expertise, greater will be the perception of the importance of the competency.

In view of the r^2 (the Pearson coefficient squared determines to what degree motivation contributes to self-efficacy in each variable or item –correlation of motivation an self-efficacy) shown in *Table 4*, motivation for items 10 and 23 (Recognizing the author's ideas in the text and Knowing the ethical code of one's academic/professional field) alone contributed 20% to the self-efficacy scores of the same. Moreover, there were three items that contributed 10% to the self-efficacy score.

Table 4. Differences between motivation and self-efficacy

	Items	Difference between means	Difference in standard deviations	Pearson Coefficient *r*	r^2
1.	Knowing how to use printed information sources	0,84	1,8581	0,31	0,10
2.	Knowing how to access and use automated catalogues	2,4	2,5633	0,21	0,04
3.	Knowing how to consult and use electronic sources of primary information	1,53	2,0882	0,36	0,13
4.	Knowing how to consult and use electronic sources of secondary information (e.g., databases)	1,88	2,4576	0,30	0,09
5.	Knowing the terminology of one's field	1,71	1,7210	0,40	0,16
6.	Knowing how to search and retrieve information on the internet (advanced searches, directories, portals)	2,08	2,5388	0,31	0,10
7.	Knowing how to use informal electronic sources of information (e.g., blogs, distribution lists)	2,18	2,8042	0,24	0,06
8.	Knowing informational search strategies (descriptors, Boolean operators)	2,6	2,9062	0,35	0,12
9.	Knowing how to assess the quality of the information resources	2,03	2,1972	0,23	0,05
10.	Recognize the author's ideas in the text	0,91	1,7396	0,44	0,20
11.	Knowing the typology of the sources of scientific information (e.g., Thesis)	1,01	2,0772	0,21	0,04
12.	Being able to determine if an information resource is updated	1,91	2,2019	0,20	0,04
13.	Knowing the most relevant authors or institutions in you field of inquiry	2,13	2,2733	0,41	0,17
14.	Knowing how to summarize and outline information	1,58	2,1608	0,32	0,10
15.	Being able to recognize the structure of a text	1,36	2,1191	0,41	0,16
16.	Knowing how to use database managers (e.g., Access)	3,07	2,9299	0,10	0,01
17.	Knowing how to use bibliographic reference managers (e.g., EndNote)	2,64	2,9976	0,31	0,10
18.	Knowing how to manage statistical programs and spread sheets (e.g., Excel)	2,1	2,8049	0,25	0,06

19.	Knowing how to install informatics programs	1,98	3,0215	0,33	0,11
20.	Knowing how to communicate in public	1,64	2,2719	0,03	0,00
21.	Knowing how to communicate in other languages	3,5	2,6929	0,20	0,04
22.	Knowing how to draft a documents (e.g., report, academic work);	1,4	1,6911	0,24	0,06
23.	Knowing the ethical code of one's academic/professional field	1,6	2,2132	0,44	0,20
24.	Knowing the laws regulating the use of information and intellectual property	2,77	2,7038	0,28	0,08
25.	Knowing how to make academic presentations (e.g., Power Point)	0,76	1,7878	0,17	0,03
26.	Knowing how to disseminate information on the internet (e.g., Webs, blogs)	3,01	3,2266	0,19	0,04

The descriptive analysis of the transversal competency categories included in ALFIN-HUMASS yields varying results (*Table 5*). At the high end of motivation, we find the category of Communication with a score of 8.41. It appears this transversal competency is the most important in the minds of students. For self-efficacy, Evaluation also yielded the highest score (6.75), suggesting that this is perceived as the most broadly acquired transversal competency. The scores for the Processing transversal category came in below the mean for both motivation and self-efficacy. Students believe this is their weakest area of expertise and they also lend it the least importance. The category they believe least important is that which: "[…] is that which worries them the least, in that they exhibit the least interest in it when learning it and with regard to improving their degree of competency" (Pinto and Puertas, 2012: 9. Translated from Spanish).

Table 5. Central Tendency of Categories N=146

		Motivation		Self-efficacy	
	Transversal competencies	Media	Standard Deviation	Mean	Standard Deviation
1	Search	8.22	1.54	6.32	2.33
2	Evaluation	8.35	1.37	6.75	2.06
3	Processing	8.06	1.75	5.94	2.59
4	Communication	8.41	1.42	6.31	2.26

It is interesting to note that under the Processing category, students feel they are best prepared in the item they view as most important. (*Table 6*)

Table 6. Analysis by competency category

Categories	Most Important Competency	Least Important Competency	Best Acquired	Worst Acquired
Search for information	Knowing the terminology of one's field	Knowing how to use informal electronic sources of information	Knowing how to use printed information sources	Knowing information search strategies
Means	8,60	7,66	7,55	5,44
Evaluation of information	Being able to determine if an information resource is updated	Knowing the typology of the sources of scientific information	Recognize the author's ideas in the text	Knowing the most relevant authors or institutions in you field of inquiry
Means	8,44	8,29	7,39	6,22
Treatment of information	Knowing how to summarize and outline information	Knowing how to install informatics programs	Knowing how to summarize and outline information	Knowing how to use bibliographic reference managers
Media	8,4	7,86	6,82	5,03
Comunicación y difusión de la información	Knowing how to draft a documents 8,7	Knowing the laws regulating the use of information and intellectual property	Knowing how to make academic presentations	Knowing how to communicate in other languages
Means		8,07	7,83	4,95

Broken down in terms of academic year (*Table 7*), we see that fourth year students are the most highly motivated. It is important to work with first year students because they are the least motivated and least self-effectual. The highest self-efficacy is with second year subset.

Table 7. Differences between motivation and self-efficacy

Academic year	Motivation		Self-efficacy	
	Mean	Standard Deviation	Mean	Standard Deviation
1st year	8,07	1,84	5,33	2,72
2nd year	8,45	1,38	6,96	2,15
3rd year	8,17	1,53	6,79	1,99
4th year	8,51	1,06	6,92	2,21

An analysis of the items under the Learning Habits category also yields relevant information. *Figure 1* shows the proportions of the four main cate-

gories of Learning Habits: Independent learning, Classroom lecture, Library work and Courses. Self-teaching and classroom learning were particularly significant in the surveyed population, while the Library as learning habit was rated quite low.

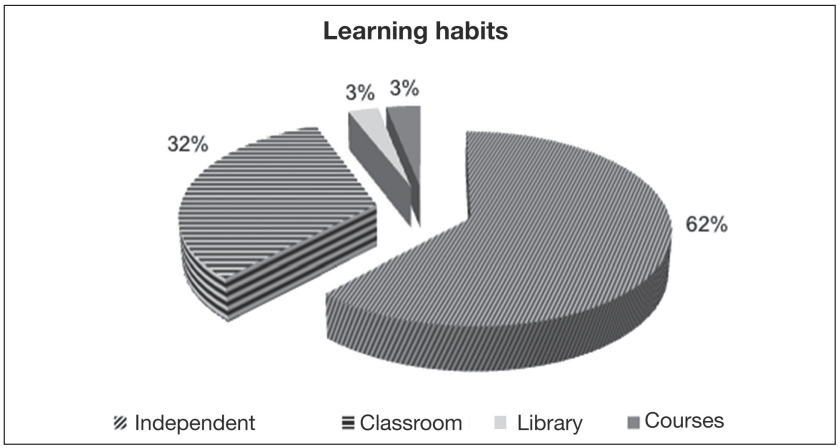

Figure 1. Learning habits

Conclusions

The study shows that informational competencies are very significant to the graduation requirements in Information Science. In general, IS students exhibited high levels of motivation in most items. Pinto has pointed out that: "[…] motivation is the keystone of informational literacy." (2011: 146. Translated from Spanish). In contrast, their levels of self-efficacy are quite low. This situation should be exploited by working with the high levels of motivation to improve self-efficacy.

Those items exhibiting high levels of motivation and self-efficacy, invite further study in order to understand the relationship between beliefs and genuine satisfaction. In light of these results, the faculty should exhort students to act as facilitators to develop these competencies across the diverse areas of the university.

The student body is least motivated in the competency associated with Processing information. In this area, students must be made more aware of how important it is in professional practice. Moreover, the data show that

students are least motivated in the competencies in which they feel least prepared. This result is quite interesting since student do in fact take several courses focusing on this competency.

Priority should be given to raising motivation in items 2- Knowing how to access and use automated catalogues, 11- Knowing the typology of the sources of scientific information, 15- Being able to recognize the structure of a text and 23- Knowing the ethical code of one's academic/professional field. Information professionals are committed to excellence in the use of new information and communications technologies, management of non-traditional sources of information, identifying information content, professional ethics and the values and principles of the profession. Moreover, the low scores in motivation and self-efficacy in the item 17- Knowing how to use bibliographic reference managers must be addressed immediately. Interestingly, the item scoring highest and that scoring lowest in motivation and self-efficacy were the same in this study and in the study performed by Pinto (2011) and Pinto and Puertas (2009, 2012). The high degree of dispersion reveals the lack of uniformity and coherence among the sample population with regard to the informational competencies, even among IS majors.

Our results regarding information competencies strongly suggest that ALFIN programs should be included in the IS curriculum. The need to achieve higher degrees self-efficacy in these students is also clear, because they must meet the demands of the information society. Only in this way can the information professionals meet the challenges of the twenty-first century and capitalize on new opportunities. Moreover, these information professionals will, in turn, will be charged with developing information competencies, so a strong foundation must be provided in the present.

Qualitatively, the study shows the persistence of the independent learning modality, which points to the need to develop and integrate information competencies into the curriculum of the specialization. This also evidences the importance of the work of the Faculty Library and urgency of greater collaboration among librarians and professors. This integration must begin in the first year with the aim of spurring the motivation of learners.

Within the context of Cuban higher education, this study is, doubtless, a pioneering work, which will point the way to new studies of the Latin American context; because when we have an understanding of informational competencies from the student perspective, we can take concrete, correct action.

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Works cited

ACRL/ALA (2000), *Normas sobre aptitudes para el acceso y uso de la información en la educación superior.* Accessed May 21, 2009. http://www.aab.es/pdfs/baab60/60a6.pdf

Gómez-Hernández, J. A. (2009), "Aprender a enseñar competencias informacionales a los usuarios: avances en la formación profesional en España." *Anuario ThinkEPI* 3: 106-113.

González, C. L.; Sánchez, Y., and Lezcano, Y. (2012), "Estudio exploratorio sobre las competencias informacionales de los estudiantes de la Universidad de la Habana." *Ciencias de la Información* 43 (2): 61-68.

Meneses-Placeres, G., and Frías-Guzmán, M. (2011), "La alfabetización informacional en los procesos curriculares de las ciencias de la información en Cuba." *Revista Interamericana de Bibliotecología* 34 (1): 9-22.

Pinto, M. (2011), "An Approach to the Internal Facet of Information Literacy Using the IL-HUMASS Survey." *Journal of Academic Librarianship* 37 (2): 145-154.

—— (2010), "Design of the IL-HUMASS survey on information literacy in higher education: A self-assessment approach." *Journal of Information Science* 36 (86): 86-103.

Pinto, M., and Lopes, C. (2010), "IL-HUMASS – instrumento de avaliação de competências em literacia da informação." Paper presented at *X Congreso de la BAD*, Guimaraes, Portugal, April 7-9.

Pinto, M., and Puertas, S. (2012), "Autoevaluación de la competencia informacional en los estudios de Psicología desde la percepción del estudiante." *Anales de Documentación* 15 (2): 1-15.

Pinto, M., and Puertas, S. (2009), "El aprendizaje por competencias transversales: la competencia informacional y comunicacional de los estudiantes de la titulación de Comunicación Audiovisual." *Diálogos de la Comunicación* 78: 1-14.

Pinto, M.; Doucet, A. V., and Fernández-Ramos, A. (2008), "The role of information competencies and skills in learning to abstract." *Journal of Information Science* 34 (6): 799-815.

Quindemil, E. (2010), "Introducción de la alfabetización informacional en la especialidad de Bibliotecología y Ciencias de la Información." *Acimed* 21 (2).

Sánchez, M. (2012), "La gestión de competencias informacionales en las universidades: resto para los profesionales de la información." *Revista de Comunicación Vivat Academia* 121: 50-64.

—— (2010a), "Acotaciones teórico-conceptuales sobre la evaluación y desarrollo de las competencias desde la perspectiva informacional." *Ciencias de la Información* 41 (2): 27-37.

—— (2010b), *Competencias informacionales en la formación de las BioCiencias en Cuba*. PhD diss., Universidad de Granada.

—— (2008a), "Breves comentarios teóricos sobre la evaluación, el desarrollo y la certificación de las competencias en información. A propósito de una revisión de la literatura." *Acimed* 18 (1).

—— (2008b), "Las competencias desde la perspectiva informacional: apuntes introductorios a nivel terminológico y conceptual, escenarios e iniciativas." *Ciência da Informação* 37 (1): 107-120.

Sánchez, M., and Vega, J. C. (2004), "El profesional de la información en el ámbito iberoamericano." *ACIMED* 12.

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Ser artículos de investigación
- Presentar un tema original y/o innovador.
- Tener enfoque novedoso a temas ya tratados.
- Llevar a cabo una aplicación metodológica nueva o distinta al tratar un tema.

Metodología
- La metodología utilizada debe ser consistente (implícita o explícita) y aplicarse adecuadamente al tema.
- Las conclusiones deben corresponder a la argumentación presentada y desprenderse de ésta de manera lógica y coherente.
- La estructura del trabajo debe contener los elementos mínimos que se requieren para un artículo.
- El uso y las fuentes bibliográficas y/o electrónicas deben ser actualizadas, suficientes y pertinentes al tema que se esté tratando.

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- Sólo se aceptarán artículos que cumplan con los requisitos antes mencionados.
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- Se pueden enviar reseñas críticas sobre libros de publicación reciente en las áreas de Bibliotecología, Archivología, Documentación o Ciencias de la Información, con una extensión máxima de 10 cuartillas. Todas las reseñas se turnarán al Comité Editorial para su revisión y se someterán a corrección de estilo especializada.

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- Se aceptan artículos en idiomas español, inglés, portugués y francés.
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- The methodology (implicit or explicit) should be consistent with and appropriate to the topic studied.
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- Apresentar uma aplicação metodológica nova ou diferente sobre um tema.

Metodologia

- A metodologia utilizada deve ser consistente (implícita ou explícita), e aplicar-se adequadamente ao tema.
- As conclusões devem corresponder à argumentação apresentada e distinguir-se desta de forma lógica e coerente.
- A estrutura do trabalho deve conter os elementos mínimos que são requeridos para um artigo.
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