RU&SC Revista de Universidad y Sociedad del Conocimiento

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Monograph "Information and Digital Competencies in Higher Education"

ARTICLE

Higher Education and the Knowledge Society. Information and Digital Competencies

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Submitted in: February 2010
Accepted in: March 2010
Published in: July 2010

Abstract

This article contains a series of concepts connected with the new challenges and commitments for higher education institutions in the knowledge society. These challenges not only imply significant changes to teaching models, but also the incorporation of information and communication technologies (ICTs). In today's world, where the need for lifelong learning has been accepted and new technologies have taken on a significant role, higher education has no option but to reconsider its objectives in the light of growing societal demands and new sociocultural trends. The changes demanded for higher education are based on a social need to make it scientifically and economically beneficial. In this context, the incorporation of new formats like the one involving the concept of competency, for example, has taken a firm hold. On the basis of references contributed by the DeSeCo project, this article defines the concept of competency as a referential element for certain changes that are taking place in higher education. It takes an in-depth look into the idea of training in information competencies, the meaning of which is analysed in this article. These are considered to be an advance on IT competencies (instrumental), since they are linked to knowledge construction processes of greater complexity.

Keywords

higher education, knowledge society, digital competencies, information competencies, information and communication technologies (ICTs)

Universidad y sociedad del conocimiento. Las competencias informacionales y digitales

Resumen

Este artículo incorpora una serie de conceptos relacionados con los nuevos retos y compromisos que afrontan las instituciones universitarias ante la denominada sociedad del conocimiento. Estos retos implican cambios significativos en los modelos de enseñanza y la incorporación de las tecnologías de la información y la comunicación. En el mundo actual, donde se ha asumido

la necesidad de la formación a lo largo de la vida y las tecnologías han pasado a tener un papel relevante, la universidad está abocada a replantearse sus objetivos ante las demandas crecientes de las sociedades y las nuevas pautas socioculturales. Los cambios exigidos en torno a la educación superior vienen apoyados en la necesidad social de establecer su rentabilidad científica y económica. En este contexto, la incorporación de nuevos formatos como el que implica la incorporación del concepto de competencia ha tomado mucha fuerza. En este texto, a partir de las referencias aportadas por el Proyecto DeSeCo se define el concepto de competencia, como elemento referencial de algunos de los cambios que se están produciendo en la educación superior. Se profundiza en la idea de formación en competencias informacionales, cuyo sentido se analiza en esta aportación. Estas se plantean como un avance respecto a las competencias informáticas (instrumentales), quedando vinculadas a procesos más complejos, ligados a la construcción de conocimiento.

Palabras clave
enseñanza superior, sociedad del conocimiento, competencias digitales, competencias informacionales, tecnologías de la información y la comunicación

Institutions in the Knowledge Society

Due to the characteristics and rapid global spread of information and communication technologies (ICTs), significant changes are taking place in many areas in general and in institutions in particular. Authors like Tedesco (2000) and Castells (2009) suggest that the ability of States to control and manage the flow of information has become weaker because the new opportunities opened up by digital technologies have eradicated political and social borders constraining communication and information.

Complex interrelationships and dependencies in a multitude of areas are characteristic features of the world we live in today, especially as they develop and become established on a global scale. We speak of an "interconnected world", where anything and everything can be found, shown, exchanged, transferred, received, sold and bought in real time anywhere in the world. One of the most far-reaching consequences of this reality is that users need to evolve and adapt to these new technologies very quickly and at all levels.

One of the characteristic features of the new society being shaped by ICTs is the central role that knowledge plays. When discussing ways of creating knowledge, Raffaele Simone (2001) underscores three periods or cultural milestones: the written word, the printing press and electronic communication. From this evolutionary angle, the author considers that literacy has led to very productive skills for exchanging and retrieving of knowledge. In addition, he points out that the third phase may give rise to a questioning of cognitive habits or, at the very least, that it may by necessary to reflect on the changes in our mental structures that this evolution is producing. Simone's perspective suggests that it is necessary to identify several fundamental components: a) technical: technology as a tool for knowledge and, therefore, for intelligence and culture; b) mental: evolution from the spoken word to the written word, from reading to non-alphabetic vision and listening; c) ways our minds work with information: reception, production and transformation, and their consequences on knowledge formation.

The social and cultural changes taking place in today's society, which are often closely linked to the presence of new information technologies, have a significant impact not only on the production of goods and services, but also on social interrelationships as a whole. The accumulation of information, the speed of its transmission, the breakdown of limitations or spatial barriers, the simultaneous use of media (image, sound, text, code, etc.) are, to name but a few, some of the elements that go to explain the enormous capacity for change that these technologies have. Their use forces us to modify the value of basic concepts like space and time. The very notion of reality is now beginning to be reconsidered, given the potential for virtual realities to be built, posing new problems and raising new questions of an epistemological nature.

For Professor Tedesco (2000), the evolution of technologies responds to the requirements of social relationships. This hypothesis contrasts sharply with the extreme technocratic view, which maintains that technologies themselves are responsible for bringing about changes in social relationships. A dynamic relationship clearly exists between both components, but the active role in these processes is played by social relationships and human beings, and not by their products. It was not the printing press that led to the democratisation of reading; rather, it was the social need to democratise culture that

led to the invention and spread of the printing press. It is important to acknowledge that socialising the technique is the problem, not technifying society (Wolton, 1997).

Now more than ever, the democratisation of access to knowledge and of its development is crucial for social cohesion. However, an education with these characteristics is substantially different from a traditional education, especially from the point of view of management, methodologies and content. Consequently, the transformation of education is a palpable reality in most countries (Tedesco, 2000, p. 56).

Access to knowledge is a universally recognised right. National education systems work to provide that access and invest more and more resources in doing so. Social practices and models are examined and reformed in the light of new information. Hence, we find a reality shaped by reflexively applied knowledge, though we can never be sure that a given element of that knowledge will remain unchanged. Under modern-day circumstances, no piece of knowledge is definitive in the traditional sense, in which "knowledge" implies certainty; this applies equally to scientific knowledge as a whole (Giddens, 1997).

Higher Education and the Need for Change

In the field of higher education, and consistent with the previous reflection, the creation of knowledge is the most important challenge that universities face, which, because of its nature, is also a collaborative endeavour. Regarding factors that promote change, it is worth pointing out that the impact of technologies on traditional universities has not been revolutionary because the usual structures have not disappeared. However, there have been significant changes based on analyses of new social and educational demands. Driven by technologies, these changes have been constant in recent years. For universities, these changes have impacted on their objectives and management models, and on teaching and research priorities.

Education is a social construction based on a theoretical model, shaped by several educational stages. In today's world, students find a society that is becoming more and more technologised. An overly simplistic focus when dealing with the relationship between new technologies and education involves bringing it down to instrumental aspects only. This implies that new technologies are considered as yet another medium in the teaching staff's resources portfolio, without really taking on board the most far-reaching dimensions of change. Therefore, we must bear in mind that it may be necessary to redefine our priorities as educators.

Neil Postman suggests an important distinction between a technology and a medium. According to his distinction, a technology becomes a medium when it secures a place in a specific social context. Consequently, a technology is simply a tool or a machine, while a medium is a social and cultural creation (Postman, 2006, p. 145). This view implies that the use of a technology by a specific culture is not necessarily the only way it can be used. Hence, it is possible to use a technology in ways that lead to social, economic and political consequences that vary greatly from one culture to another. Therefore, this "transformation" of a technology into a useful, applicable medium is a process that needs to be implemented at various levels – social, institutional and personal – in order to seek and find the "real usefulness" that technology can bring in terms of added value.

From an educational viewpoint, it is possible to talk about different models or views in such a way that the role technologies play in each of them is different. Thus, from the perspective of "educational engineering", learning is conceived as a closed, manipulable and evaluable process. In this model, the teaching staff have all the authority and responsibility for education. In contrast, from a different educational culture like, for example, the one represented by a constructivist view of learning, education is considered to be a process of knowledge construction in which initiative and authority are shared by teaching staff and students. The two models referred to above are clearly incompatible in practice and, consequently, they are two cultural references that demand distinct and differentiated uses of technologies. Along the same lines, the culture of educational organisations is also affected by the management models applied to it. These, in turn, determine the types of uses to which technologies are put.

Faced with this reality, higher education institutions have no option but to take a new, deep-seated approach to what they do (Casas, 2005), which involves analysing what they offer society. In this respect, Tünnermann refers to their academic structures as being too rigid, not very diversified and lacking in appropriate communication channels between their various disciplines and the world of production and work. In many cases, the uniformity of their programmes does not allow them to attend to the wide range of interests and motivations of a student population that is ever broader and more diverse; excessive compartmentalisation runs against the essential interdisciplinary nature of modern knowledge;

their attachment to formal systems prevents them from effectively serving the purposes of lifelong learning (2000, pp. 100-101).

Higher education institutions have realised that e-learning technologies form part of the solution, since they allow students to be prepared for a connected world. In fact, technologies are becoming agents of transformation – and not just evolution – (Pittinsky, 2006, p. 7) in both academic education and vocational training. Higher education must become the "wired tower", a concept that supersedes the "ivory tower". The book containing the proceedings of the conference held in April 2001 in Washington DC to discuss the impact of the Internet on higher education, on the basis of contributions made by leading experts in the field, has a famous original title that alludes to the "ivory tower" (Pittinsky, 2003).

Competencies as a Reference for Education

International interest in reforming education systems, in searching for new ways to design curricula and to understand teaching and learning processes, has taken shape through a number of different projects backed by UNESCO and the OECD. One of them, called DeSeCo (Definition and Selection of Competencies), issued its initial results in 2001 in a report entitled *Defining and Selecting Key Competencies*. Two years later, in 2003, and coinciding with the final project, a second report was issued: *Key Competencies for a Successful Life and Well-Functioning Society*. Both reports were compiled by Dominique Simona Rychen and Laura Hersh Salganik; the former as the project director and a member of the Swiss Federal Statistical Office, and the latter as the director of the Education Statistics Services Institute in Washington. On the basis of these reports, most OECD countries, including Spain, began to reformulate the school curriculum in line with the controversial, complex and powerful concept of competencies (Pérez Gómez, 2007).

Initially, at some point in the 1960s, competencies as a reference for education were formulated in the area of vocational or occupational training, closely linked to the processes of in-company training and technological training in educational institutions. However, over the years, most the traits of competencies have been incorporated into institutions that train professionals; this is much more inclusive, and not limited to the technical area. From this holistic, integral perspective, it was considered that training provided by educational institutions (higher education, in this instance) should not simply be designed with a view to incorporating an individual into productive life through employment. Besides promoting the development of certain attributes (skills, knowledge, attitudes, aptitudes and values), it was felt that the design of training should consider the need to intervene within the context and culture of the workplace. At the same time, it should allow for training in specific contexts to be generalisable (Gonczi, 1996).

In accordance with the DeSeCo project, a competency is defined as "the ability to meet individual or social demands successfully, or to carry out an activity or task. […] Each competence is built on a combination of interrelated cognitive and practical skills, knowledge (including tacit knowledge), motivation, value orientation, attitudes, emotions, and other social and behavioural components that together can be mobilised for effective action" (2004). Along the same lines, it points out the following consideration, taken from a document on key competencies for lifelong learning produced with the backing of the Directorate General for Education and Culture of the European Commission (2004): "'Competence' is considered to refer to a combination of skills, knowledge, aptitudes and attitudes, and to include the disposition to learn in addition to know-how. […] Key competences represent a transferable, multifunctional package of knowledge, skills and attitudes that all individuals need for personal fulfilment and development, inclusion and employment". These definitions clearly reflect the main nuances of the concept of competency. The first refers to the mobilisation of knowledge (Perrenoud, 1998). From this angle, being competent in an area of activity or practice means being capable of activating and using relevant knowledge to cope with certain situations and problems connected with that area. A second specification refers to reflexiveness and the use of metacognitive skills as prerequisites for any key competency, since a competency requires more than the ability to apply something that has been learned to an original situation. Reflexiveness refers to the internal structure of a key competency; it is an important cross-disciplinary characteristic, relevant to the conceptualisation of key competencies (Rychen & Salganik, 2006, p. 106).

When identifying and defining curricular learning in competency terms, we are placing emphasis on the articulated and interrelated mobilisation of different types of knowledge, and not on the characteristics of disciplines, with everything that this implies. Equally, reference to the context in which competencies are acquired is important, as is reference to the context in which they will subsequently

be applied. Competencies cannot be separated from the practical contexts in which they are acquired and applied. An approach based on the acquisition and development of general competencies will probably highlight the need to teach students to transfer what they have learned in a specific situation to other situations. Approaches based on competencies – or on situated skills, that is to say, on skills that include, in their specification, a reference to knowledge and specific situations – will stress the need to work on competencies in order to apply what has been learned to different contexts.

The DeSeCo project's final competency categories and key competencies are shown in the following figure:

Following an extensive study in which the interdisciplinary perspective and cross-disciplinarity were always present, the conclusion drawn was that the three most important dimensions for competency development were: socialisation, personal autonomy and the ability to use technology interactively.

Competency-based learning also implied the ability to carry on learning throughout life, allowing metacognitive skills to be developed, which make independent and self-directed learning possible. Competent learners that are aware of and can regulate their own learning processes from both cognitive and emotional viewpoints can make a strategic use of their knowledge, adapting it to the demands of the content or learning task and the characteristics of the situation (Bruer, 1995).

According to Bolívar (2009), the concept of competency is linked to the principle of "learning to learn"; to some extent, this idea is at the root of all key competencies. Likewise, the very idea of competency is clearly linked to the concept of lifelong learning, as a complementary prerequisite of the former. In the DeSeCo project (2006), metacognitive strategies for "learning to learn" are, rather than a specific competency, a prerequisite for all of them. Within the context of the Lisbon Strategy, the European Union's recognition of the need to support lifelong learning to shape the knowledge society implies giving citizens the necessary tools to allow them to "learn to learn" independently.

Figure 1. DeSeCo project competency categories and key competencies (Rychen, 2006)

Competency categories and key competencies (DeSeCo)
Interacting in heterogeneous groups
The ability to relate well to others The ability to cooperate The ability to manage and resolve conflicts
Acting autonomously
The ability to act within the big picture The ability to form and conduct life plans and personal projects The ability to assert rights, interests, limits and needs
Using tools interactively
The ability to use language, symbols and text interactively The ability to use knowledge and information interactively The ability to use technology interactively

As indicated previously, competencies need to be recognised in practice through the fulfilment of clearly established performance criteria. These criteria, understood as being the results of learning (evidence), set the conditions for being able to assess performance; both elements (criteria and evidence) form the basis for evaluating and ascertaining whether or not mastery of a competency has been attained. Likewise, evaluation criteria are closely connected with the characteristics of established competencies.

The concept of competency suggests a meaning of unity, and implies that elements of knowledge have meaning only as part of a whole. Indeed, even though a competency can be broken down into component parts, separately these do not constitute a competency: being competent means having a mastery of all the elements and not just one (or some) of them.

The integrated professional competency model establishes three levels of competency: basic, general and specific. Basic competencies are the indispensable intellectual abilities for learning a profession; they include cognitive, technical and methodological competencies, many of which are acquired at prior levels of learning (for example, the use of oral, written and mathematical languages). General professional competencies are either shared by the profession as a whole or refer to specific work situations that require complex responses. Finally, specific competencies apply to a job, and are linked to specific requirements for doing it. Understood thus, basing educational models on professional competencies implies reviewing the procedures of educational object design, of educational perceptions that guide teaching-centred practice (and with that, educational practice itself), and of criteria and procedures for their evaluation.

Anyone with the necessary knowledge, skills and aptitudes to do a job possesses professional competency. Consequently, they are able to solve work-related problems autonomously and flexibly, and are able to collaborate in order to improve the working environment and the organisation of the posts that they hold. Going further into the definition given, we could consider professional competencies to be the underlying characteristics of a

person, which are connected with the proper performance of a job, which may be based on motivation, character traits, self-worth, attitudes and values; all in all, a variety of knowledge or cognoscitive or behavioural capacities. In short, it is a matter of any individual characteristics that can be measured reliably and whose relationship with the performance of a job can be demonstrated.

The final report of the Tuning project (González & Wagenaar, 2003), aimed at identifying competencies that needed to be developed in the higher education setting, underscores the importance of considering (university) degrees in terms of the results of learning and, in particular, in terms of competencies: general (instrumental, interpersonal, systemic) and specific to each subject area (including knowledge and skills particular to the disciplinary fields and degrees). This consultative study was done on graduates, employees and academics in several European countries, and the thirty most highly valued general competencies were identified.

The information society and the knowledge society are placing demands on education that differ from traditional ones, and they are clearly connected with the development, in all citizens, of the ability to learn throughout their lives. In other words, the problem does not lie in the quantity of information that children and teenagers receive, but rather in the quality of it: the ability to understand it, process it, select it, organise it and transform it into knowledge, as well as the ability to apply it to different situations and contexts depending on the values and intentions of their own personal or social projects. In today's democracies, education systems are facing major challenges that are very closely connected: first, consolidating a comprehensive schooling that allows everyone to develop their abilities as much as possible, while respecting diversity, guaranteeing equality of access to education and redressing inequalities; second, fostering the education of autonomous individuals, who are capable of taking informed decisions about their own lives, and of participating in working and social life in a relatively autonomous way.

Information and Digital Competencies

The European Union's European Higher Education Area (EHEA) initiative aims to gradually build a "Europe of Knowledge" in order to foster greater economic growth and social cohesion, based, according to its aims, on action in the areas of citizen education and training. Therefore, we are talking about an educational reform of a transnational nature that pursues a minimum of two fundamental objectives: establishing a quality education system that considers the mobility of students and teachers and, consequently, the creation of a new European reference in the international context, with an increase in competitive capacity in all social and economic sectors.

This joint reform of higher education studies in European Union (EU) Member States is based on several essential concepts that can be summarised in the following principles:

a) Education is planned, preferentially, as a process of lifelong learning.
b) The structure and design of degrees is reformulated to take account of the professional profiles that society requires.
c) Reflection is required on the objectives, competencies and knowledge to be attained.
d) It is considered essential to demand coherent teaching methodologies.
e) New administrative and management actions are generated.

The current European work context is characterised by the emergence of new forms of labour relations, new forms of work, new areas of work and new workers (Castells, 2000). It is a matter of a new reality that contemplates new approaches, such as self-employment, outsourcing, part-time work, temporary work, flexible work, etc. Given this situation, universities taking on the responsibility for educating new generations of professionals are confronted with a new reality. The idea of educating someone for a single, permanent job needs to be revised. The demand for new skills and competencies that allow people to cope with significant changes in their working lives is a feature of the new labour market. In addition, new demands seem to be linked to new academic scenarios, in which the amount of time spent on education is shorter than in more conventional contexts.

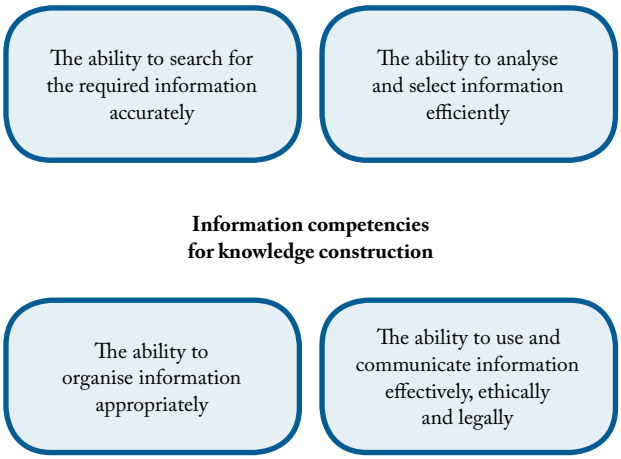
Consequently, higher education institutions are being called upon to respond to more flexible and better adapted educational demands, and to the need to incorporate new education systems, which, to a large extent, should be linked to the use of new ICTs, which are now everywhere to be found in society. This task should be carried out in a reflexive, coherent manner, and not by a conditioned response resulting from external market-driven demand. Universities should provide answers to real problems, and not only to those of an economic nature.

New technologies can play a fundamental role in the innovation of the teaching function (and also in new approaches to research). They should allow the knowledge access processes to be "tailored". Alternatives like blended learning, combining face-to-face work and distance learning, minimise the space and time constraints of conventional education. It is a matter of making learning processes more flexible by making the most of digital technology resources, such as the Internet. Today, factors determining time and space can be relativised. So it is also a matter of gaining experience and of daring to change models, routines and ways of working based on concepts and procedures that are centuries-old in some cases, and therefore linked to models that are now out of date (De Pablos, 2005).

The educational potential of digital networks means that a number of things need to be seriously reconsidered, such as the individual and collective dimension of teaching-learning processes, the pace or timing of learning, new ways of organising information for knowledge construction, the tasks and competencies of students and teaching staff, etc. However, we should remember that technology is not an educational offering in its own right. Rather, its educational validity lies in the use that education stakeholders and educational communities make of it. Hence, ICT training for teaching staff becomes one of the key factors involved in the use and utilisation of technology in systems of regulated and non-regulated education alike. That implies the construction of a new approach to education, based on new resources that allow local and global aspects to be drawn on and incorporated. The new approach should also make education in schools compatible with the creation of specialised digital networks that construct and reconstruct disciplinary knowledge and know-how. This potential needs to be channelled through the creation of new models and forms of educational management, which allow the interactive potential of virtual space to be exploited.

The virtual model may become a useful way of cutting costs and reaching the highest number of people. This is something that has been emphasised in a way that may not be impartial. However, in reality, it is more about optimising new opportunities for communication and education: providing a service that is better tailored to students, offering tutorials, reducing the number of students in each class, getting rid of most of the lectures from higher education, incorporating other information access procedures, and so on. All of these are viable alternatives. Regarding costs, it is not a matter of making higher education processes cheaper, but rather of significantly improving educational processes. In fact, that reduction in costs is not real, unless we lower the quality of education.

Figure 2. Abilities connected with information competencies



The term "new literacies" refers to the need to go a step further than instrumental or technological literacies connected with the use and integration of ICTs. It is in this context where the information literacy proposal is situated (Area, 2008, p. 6). This proposal means that, after going through an initial phase of instrumental or digital literacy, a second enabling stage needs to be covered, which involves the acquisition of competencies connected with searching for, analysing, selecting and communicating data and information, so that students are in a position to be able to transform information into knowledge. In any event, as Bawden (2002) points out, the concept of information literacy has been around since the end of the 1980s, in the field of literacy conceptualisation that has basically been developed over the last decade (Snavely & Cooper, 1997; Bruce, 1999).

The working group that produced the document entitled "Competencias informáticas e informacionales en los estudios de grado" ("Digital and Information Competencies for Undergraduate Studies") established a number of qualifying differences between IT competencies and information competencies. Digital competencies are defined as a set of knowledge elements, abilities, dispositions and conducts that enable individuals to know how ICTs work, what they are for and how they can be used to attain specific objectives (2009, p. 13). Information competencies, which are more ambitious in terms of the scope that the working group gave them, are defined as a set of knowledge elements, abilities, dispositions and conducts that enable individuals to recognise when information is necessary, where to find it, how to evaluate its suitability and how to use it appropriately in accordance with the problem posed (2009, p. 14).

This second competency level is considered to be cross-disciplinary in nature, since it follows the specifications

established by the Association of College & Research Libraries, which defines information competency as "common to all disciplines, to all learning environments, and to all levels of education. It enables learners to master content and extend their investigations, become more self-directed, and assume greater control over their own learning" (Information Literacy Competency Standards for Higher Education). Information competency should enable students to acquire the following abilities: to search for the required information accurately, to analyse and select information efficiently, to organise information appropriately, and to use and communicate information effectively, ethically and legally, with the aim of constructing knowledge.

Conclusion

The strong presence of ICTs in advanced societies, the incorporation of a cultural vision of education and the application of psychology theories based mainly on constructivist perspectives make it possible to consider education from new angles and approaches. Likewise, ICTs provide new educational formats and options, since they break down the barriers constraining curricular disciplines by allowing students to learn in an interdisciplinary, open way. They also make it possible to learn from multiculturality, and extend and multiply educational points of reference. These new educational contexts require changes in the competencies and roles of lecturers (De Pablos, 2001). Lecturers are no longer the only source of knowledge, since they "share" these competencies with documents, specialists, experts, colleagues, people from other cultures, documentary databases, etc.

This new context shaped by the knowledge society places new demands on education systems and, therefore, on higher education, since education is being called upon more and more often to offer a higher quality response to social needs. Educational institutions must change to the same extent as the societies in which they are located. Returning to Professor Tedesco's reflection referred to in this article, social demands are the ones that drive change, and not the other way round.

As proposed in this article, information competencies are considered to be an advance on IT competencies (instrumental), since they are ultimately linked to knowledge construction processes of greater complexity.

ICTs represent an opportunity for change with respect to forms and procedures for social interaction and access to information. Teaching lies at the root of these practices, since its aim is the socialisation of knowledge. Changes in communication interactivity brought about by new technologies point towards a "teaching culture revolution". The authority of lecturers no longer stems from having a monopoly over knowledge, but rather from the capacity to teach how to produce information and how to learn. We are talking, therefore, about a revision of teaching strategies used thus far. The logic of knowledge management processes is reconsidered, and this implies changing education policy and certain functions of the stakeholders involved in these processes (teaching staff, students, librarians and managers).

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Recommended citation

DE PABLOS, Juan (2010). «Higher Education and the Knowledge Society. Information and Digital Competencies». In: "Information and Digital Competencies in Higher Education" [online monograph]. *Revista de Universidad y Sociedad del Conocimiento (RUSC)*. Vol. 7, No 2. UOC. [Accessed: dd/mm/yy]. <http://rusc.uoc.edu/ojs/index.php/rusc/article/view/v7n2-de-pablos/v7n2-de-pablos-eng>
ISSN 1698-580X

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