

APPROACHING THE QUALITY OF THE SPANISH UNIVERSITIES THROUGH ICT INDICATORS

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Abstract

European universities are currently faced with the challenge of becoming a world quality reference by 2010, as agreed at the European Councils of Lisbon (2000) and Barcelona (2002).

Information and Communication Technologies (ICT), when used effectively, can help to achieve this objective, by improving the flexibility and quality of learning and facilitating the cooperation between institutions.

This paper focuses on the student as a customer of the higher education system, developing indicators related to the ICT-oriented academic profiles, the virtual secretary facilities and the e-learning experiences. A synthetic index is also proposed, approaching the quality of each considered university in the context of the information and knowledge society.

The proposed methodology is applied to the Spanish case, leading to some interesting results. The computation of ICT quality indicators for the Spanish universities allows a comparative study, suggesting the existence of a “digital divide” between them.

1. Introduction

Higher education has been considerably affected by the development of Information and Communication Technologies (ICT) which have introduced main changes in both the organisation and the learning methods.

At the European Councils of Lisbon (2000) and Barcelona (2002), Heads of State and Governments set the objective of making Europe’s education and training systems a world quality reference by 2010. Since the Information and Communication Technologies should play an important role in this process, several actions have been promoted by governments of the European Union (EU) and its Member States in order to achieve an efficient implementation of the ICT in the education system.

More specifically, the e-Learning initiative (www.europa.eu.int/comm/elearning) under the title “Designing tomorrow’s education” aims to create the appropriate conditions for the development of contents, services and learning environments, improving cooperation and dialogue at regional, national and european levels and between all the participants in the field (universities, schools, decision-makers, administrations, ...).

In this paper we focus on the student as a customer of the higher education system, trying to approach the quality of the universities through ICT indicators. More specifically, in the second section we develop some indicators related to the ICT-oriented academic profiles, the virtual secretary facilities and the e-learning experiences. A synthetic index is also proposed, in order to approach the quality of each considered university in the context of the information and knowledge society.

In the third section the proposed methodology is applied to the Spanish case, considering the World Wide Web as our main information source. The computation of ICT quality indicators for the 48 Spanish public universities leads to some interesting results, allowing a comparative study and suggesting the existence of a “digital divide”.

The paper ends with a brief exposition of its main results and some concluding remarks.

2. ICT Indicators. Definition and Information Sources

In spite of the important efforts dedicated to the comprehension of the Information Society, many difficulties arise due to its own complexity and amplitude, the inexistence of a commonly accepted methodological framework and the lack of information, especially of quantitative type. These difficulties are especially serious when the analysis is referred to specific geographical zones and/or socioeconomic activities.

The selection of a suitable measure of the ICT use is not easy. The most commonly used indicator is the Internet users percentage, although it has some problems related to its definition and computation.

Referring to the educational aspects, the main source of information on the equipment and use of the TIC are the Flash Eurobarometers of the European Commission, including the percentage of professors that use Internet in the teaching of non-computing subjects and the weekly hours dedicated to such end. Nevertheless these indicators do not include the university teaching, neither in which refers to its ICT equipment, neither on the use of ICT for the external and internal communication, nor to measure the degree of the e-learning development.

Although the quantification of the ICT educational impact faces particular difficulties, in this paper we try to approach the average achievement in a university in three dimensions of the knowledge and information society. With this aim we have considered the indicators described in table 1, showing three different aspects of the ICT impact in the higher education institutions.

Table 1. ICT University Indicators

Indicator	Definition
ICT Qualification	Availability of ICT-oriented degrees (%)
Virtual Secretary	On line academic information On line self-inscription Personalized on line facilities
E-learning	University Virtual Campus E-Learning experiences (%) Participation in Shared Virtual Campuses

a) ICT Qualification

New technical, intellectual and social skills are becoming essential for living and working in the knowledge society. The existence of new academic demands related to these new skills has been emphasized by european authorities, since a growing gap has appeared between an increasing number of employment opportunities in ICT and the number of qualified candidates to fill them.

The Information Society has also a positive impact on the quality of employment, particularly in terms of increased responsibilities, flexible skills, new models of work organisation and opportunities for e-inclusion.

Some studies have been developed about the basic qualifications learners should acquire in order to become adequately active in the Information Society, finding that not only technological abilities are required but also some social and interpersonal skills, related with the ability to communicate, to cooperate and interact, to organize and manage information and to work in the multicultural environment that the Internet establishes for all of us.

Universities have sought effective methods to develop ICT skills and knowledge in their graduates to enable them to be better fitted for employment. These methods include not only an accreditation approach with specific ICT courses but also an embedded approach where ICT skills development is integrated into the curriculum.

Since the second option is quite difficult to quantify, we focus on the first one, analyzing the academic profiles mainly related with the ICT skills (computing engineering, telecommunications, audiovisual communication, documentation, ...). In the Spanish case this information can be obtained from the Universia.net project which is currently active in 10 countries including 636 universities.

b) Virtual Secretary

The university access to the Information and Communication Technologies is highly encouraged for both administrative and educational purposes. Since the existence of on line administrative facilities increases the quality of the university services, a virtual secretary indicator should be included in the ICT synthetic index.

In order to approach the improvement in the quality of service provided to the students we have designed an extensive indicator, including the availability of official information (plan of studies, timetables, syllabuses, addresses, ...), the on line inscription facilities and the confidential access to personalized academic information.

The computation of this indicator is quite difficult due to both methodological and technical reasons. From the conceptual point of view, it must be noticed that terms such as “virtual secretary” or “virtual campus” are given different meanings depending on the institution. Besides, the information included in this indicator must be continuously updated as a result of the frequent changes in the universities.

c) E-Learning

According to the European Commission, the term E-Learning refers to the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration.

During the last years most european universities have developed e-learning strategies, including the development of virtual networks for cooperation and collaboration. In the Spanish case some recent works [Area et al. (2001), Chasco et al. (2003)] conclude that a 62% of the universities have a virtual campus.

In this study we try to approach the e-learning experiences intensity in each university, also analyzing their cooperative activity in the shared virtual campuses.

d) ICT Synthetic Indicator

Before the ICT synthetic indicator is calculated, an index needs to be created for each of the considered dimensions. Following a well-known methodology, minimum and maximum values are chosen for each underlying indicator and the university performance in each of the considered aspects (X) can be expressed as a value between 0 and 1 by applying the following expression:

$$I(X)_i = \frac{X_i - \text{Min}(X)}{\text{Max}(X) - \text{Min}(X)}$$

The three considered indicators -referred to the ICT qualification, the virtual secretary and the e-learning- can be summarized through a synthetic index. Since the assignment of weights to each of these components would be extremely difficult, an arithmetic mean can be considered as the most suitable solution, leading to an easy to compute and objective ICT synthetic indicator for each university:

$$I_i^{\text{ICT}} = \frac{1}{3} \left(I_i^{\text{Qualification}} + I_i^{\text{VirtualSecretary}} + I_i^{\text{E-Learning}} \right)$$

3. Empirical results

Spanish universities are currently faced with important challenges, including the new legislative framework, the “Bologna process” and the adaptation to the knowledge and information society.

In this section we compute ICT indicators for the Spanish universities following the previously described methodology. More specifically our study includes the 48 Spanish public universities and focuses on Internet as the main information source.

The required information has been provided by the university webs, the Universia.net project, the Spanish Ministry of Education, Culture and Sport and some recent studies such as Area et al (2001), Azcorra et al (2001) and Salinas et al. (2002).

In the case of the e-learning component it must be noticed that the indicator has considered not only the virtual campus of each university but also that related the Spanish shared virtual campuses, whose main characteristic are shown in table 2.

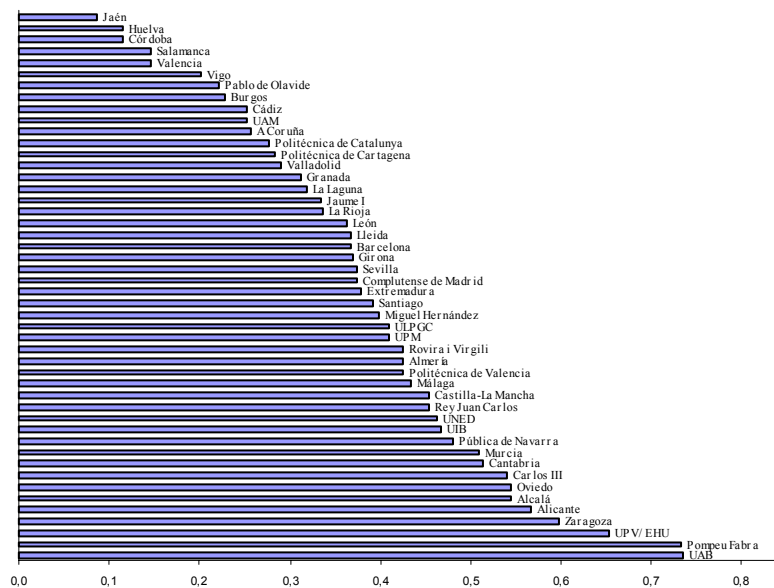
Table 2. Spanish Shared Virtual Campuses

Virtual Campus	G9 Group	ADA Madrid	Intercampus
Involved Universities	Cantabria, Castilla-La Mancha, Extremadura, Illes Balears, La Rioja, Oviedo, País Vasco, Pública de Navarra, Zaragoza	Alcalá, Autónoma de Madrid, Carlos III, Complutense, Politécnica de Madrid, Rey Juan Carlos	Autónoma de Barcelona, Barcelona, Girona, Lleida, Oberta de Catalunya, Politécnica de Catalunya, Pompeu Fabra, Rovira i Virgili
Number of students	239.607	226.387	196.341
Number of subjects	45	30	48

The empirical results of this study lead to a ranking of Spanish universities represented in Graph 1 and lidered by Universitat Autònoma de Barcelona (UAB), Pompeu Fabra and Universidad del País Vasco (EHU/UPV) while the universities of Jaén, Huelva and Córdoba are located in the last positions.

Nevertheless it must be noticed that this ranking, related to the ICT synthetic index, changes considerably for each of its different components, since no significant statistical correlation has been found between them.

Graph 1. ICT Synthetic Index for Spanish Universities



This fact can be clearly seen in Table 3 which summarizes the “top-ten” universities for each of the considered ICT dimensions. According to this information, only two universities are present in all the three cases (Universidad Autónoma de Barcelona and Universidad del País Vasco), while four universities (Pompeu Fabra, Alcalá, Oviedo and Carlos III) appear in outstanding positions according to two criteria

Table 3. University ranking for the ICT Indicators

	ICT Qualification	Virtual Secretary	E-Learning
1	Las Palmas de Gran Canaria	Autónoma de Barcelona	Pompeu Fabra
2	Politécnica de Madrid	Carlos III	Autónoma de Barcelona
3	Alcalá	Miguel Hernández	Illes Balears
4	Extremadura	Murcia	Cantabria
5	Málaga	UNED	Oviedo
6	Autónoma de Barcelona	País Vasco	Barcelona
7	Carlos III	Pompeu Fabra	La Rioja
8	Complutense de Madrid	Pública de Navarra	Zaragoza
9	Oviedo	Alcalá	País Vasco
10	País Vasco	Alicante	Lleida

As expected, the obtained results show a wide range of variation, suggesting the existence of a “digital divide” between Spanish universities. Nevertheless, no significant relation has been found between the ICT synthetic index and the university size, measured through its number of students. In fact, it can be noticed that those institutions with an outstanding number of students (UNED and Universidad Complutense de Madrid) are located in intermediate positions.

4. Concluding remarks

The quantification of the ICT educational impact faces several conceptual and empirical difficulties, especially in the context of the higher education, whose indicators are not included in the Eurobarometers.

In this paper we have considered three different dimensions of the ICT impact in the universities, which can be summarized through a synthetic index.

The results of this study provide a panoramic view of the Spanish universities in the knowledge and information society, leading to an ordering that changes substantially for each of the considered ICT indicators. Nevertheless, in general terms the most outstanding positions correspond to Universidad Autónoma de Barcelona, Universidad Pompeu Fabra and Universidad del País Vasco, suggesting the presence of significant regional differences related to a certain “digital divide”.

The obtained results open some new questions for further research, including the development of a wider system of indicators, and the definition of weights for each of the considered component. Since ICT skills and university facilities are rapidly changing, an automatic system of upgrading would also be desirable.

On the other hand, emphasis must be placed on quality evaluation. Since there is no common understanding of what we mean by quality in this context, new criteria should be developed including both objective indicators and subjective opinions.

To conclude, we must keep in mind that the information society represents at the same time a source of opportunities and challenges. In this situation, Spanish universities should efficiently use the ICT potential in order to achieve –as stated in the European Council of Lisbon- a dynamic knowledge-based economy, capable of sustainable economic growth, with more and better jobs and greater social cohesion.

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