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Use of Information and Communication Technologies in Castilla & León Universities

Las TIC en las Universidades de Castilla y León

ABSTRACT

This paper explores the uses of information and communication technologies (ICT) in the universities of Castilla and León. We believe that the integration of ICT in the universities is essential for the development of a university system in line with the requirements of the knowledge society. This piece of work must be placed within a research that has analyzed the use of ICT in higher education in the universities of Castilla and León. In our view, the uses of ICT in higher education are one of the main key indicators for its level of integration. With this research, whose goals relate to ascertaining the level of integration of ICT in the universities of Castilla and León, we seek to identify the factors that influence the use-avoidance of ICT by professors, and to describe the uses that they make of ICT in the development of their profession (teaching and research). For this reason, we have conducted an *ex-post-facto* research with a descriptive and improvement-seeking motivation. Even though the results of this research highlight the widespread use of ICT within universities, they also point out that this use is superficial and indicate a lack of actual integration of ICT in the universities of Castilla and León.

RESUMEN

El presente trabajo se enmarca dentro de una investigación que ha analizado la utilización que se hacen de las tecnologías de la información y la comunicación (TIC) en la educación superior en los centros universitarios de Castilla y León. Bajo nuestra perspectiva los usos de las TIC por parte del docente se conforman como un indicador esencial para conocer el grado de integración que éstas tienen dentro de las universidades. De esta forma los objetivos principales de la presente investigación se encuentran en relación con la indagación sobre el nivel de integración de las TIC existente en los centros universitarios de Castilla y León, tratando de identificar los elementos que influyen tanto en la utilización, como en el no uso de las TIC por parte del docente universitario, para posteriormente hacer un descripción sobre los usos a los que el profesorado destina las TIC en el desarrollo de su actividad profesional, tanto en el ámbito docente, como en el investigador. Para ello se ha llevado a cabo una investigación *ex-post-facto*, con una orientación descriptiva y de búsqueda de la mejora, cuyos resultados inciden en una generalización en la utilización de las TIC dentro de la educación superior de Castilla y León, aunque se ha de señalar que esta utilización se encuentra referida a unos usos superficiales de las TIC, lo que denota una falta de integración real de las TIC en las universidades de Castilla y León.

KEYWORDS / PALABRAS CLAVE

ICT uses, higher education, communication channels, teaching resources, educational research.
TIC, educación, universidad, usos, integración, profesorado, docencia, investigación.

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1. Introduction.

The incursion of ICT in modern society is an obvious and irreversible trend. The importance of the integration of ICT in higher education has been emphasised by UNESCO since the end of the twentieth century, considering ICT to be essential both to innovative curricular practices and in the general public's access to higher education (UNESCO, 1998). However Navarro (2009) points out that the introduction of ICT in the educational system is complicated, requiring a reconceptualization of the current systems, emplacing the ICT in the educational processes in such a way that their implementation is reflected in the development of both an organisational and social collective intelligence.

The benefits of the integration of ICT in the educational processes have been described by various authors (Valdez & otros, 1999; Marquès, 2000; Cox & otros, 2003), in the same way as the contributions of Hinojo, Aznar & Cáceres (2009) indicate that the in-

clusion of ITC in education favours the flexibility of the teaching and learning processes, which permit more maturity and importance to the students within the learning processes. Under these precedents, it is no surprise that the implementation of ICT in the educational system has been a recurring theme of educational research. However, the majority of this research has been based on studies of the integration of ICT outside the universities, being based on primary and secondary education, with less research on higher education.

Being aware of the relevance of the theme and the important challenges which the Spanish Higher Education institutions have to face in the 21st century, this research has been proposed with the intention of determining the current status of ICT integration in universities of Castile and Leon.

The research is based upon four general objectives:

- 1) To identify the elements which influence the use and non-use of ICT by the university teaching staff.

Author/director	Principal conclusions
Tomàs, Feixas & Marquès (2000)	Teaching; new contents and competences in the curriculum, new instruments and facilities for teaching and its administration, new communication channels for learning and the collaboration and need for new training for the teaching staff. Research; capacity to manage and process a great amount of data, capacity to communicate scientific advances with rapidity, possibility to keep in constant contact with researchers from all over the world. Administration: Changes especially in the academia and economic administration, internal and external communication and human resources.
Area (2002)	Spanish universities find themselves in an expansive phase of creation and development of the campus and virtual services or virtual services for university teaching. It is to be expected that the offer of online course and programmes will notably increase in the short to medium term.
Cabero (2002)	Negative perception of the amount of existing media. The computer is considered a fundamental element. Limited training of the teaching staff in ICT. Teachers are more consumers than producers of ICT.
Chasco, González & López (2003)	It would mean a reduction in costs, easier access, dynamic learning and the establishment of fluid communication channels. The general online learning offered in Spain is centred on the postgraduate level, although it is opening up towards degrees and subjects/credit courses.
López & otros (2003)	There are significant differences on a regional level between Spanish universities conforming to a "digital divide". A consistent system of ITC indicators must be developed, which would permit quality evaluation within the context.
Barro & otros (2004)	The Universidad Carlos III of Madrid is the university with the best ratio of computers to students (2.68 students/computer), in the opposite extreme we find the University of Granada with 16.35 students per computer. The expense on ICT represents 2,57 % of the global budget of the universities. In 2003 46.9% and 31.3% of the surveyed universities offered education in ITC and E-learning respectively. These universities claim to have offered an average of 97.1% of training courses in ICT and 17.9% in E-learning.
Barro & Burillo (2006)	In the Spanish university system there are 18.1 students per computer in teaching classrooms. 37% of the subjects taught support the obligatory assistance classes with the use of some software platform of educational use. 87% of the universities possess an institutional plan for virtual teaching. 96% of the universities present an institutional platform for virtual teaching.
Uceda & Barro (2007)	Spanish universities increasingly rely more on ICT, 93% have an institutional plan of virtual teaching. There is an average of 1.34 computers to university teachers and researchers (PDI), and 81.9 % of researchers and 66.1% of the universities publish their scientific activity on the web. The teaching classrooms have 1 computer for every 16.4 students and 51.7 % of student desks in the classes have an internet connection.

Table 1. Summary of investigation and conclusions about the integration of ITC in Spanish Higher Education.

2) To describe the uses that the university teaching staffs make of ICT in their professional activities (teaching and research).

3) To collect information on the levels of motivation, training and satisfaction of the university teaching staff in relation to the possibilities that the ICT offer them for the development of their professional practice.

4) To analyse the means developed by the universities which favour the use of the ICT by the university teaching staffs.

In this article the results related to the first two objectives are presented, intending to respond to the questions: how and why are ICT used in the universities of Castilla y León? and: which elements influence their utilisation?

2. Methodology and instruments used

The research carried out is based upon the non-experimental methodology (Latorre & otros, 2005), more specifically of the type *ex-post-facto*, after the event (Buendía & otros, 1998; Latorre & otros, 2005), with a descriptive orientation and the search for improvement. In this research the phenomenon has already occurred (Bisquerra, 2004), or is in a development stage, not producing a manipulation of independent variables, for which, as Kerlinger indicates (1975: 268), the researcher 'has no control over the independent variables because of the facts or because they are inherently non-manipulable'

In consistency with the methodological orientation of the research, two instruments of different typology have been chosen: questionnaire and interview. The intention has been to collect information about the perceptions and sensations of the university teaching staff with respect to ICT through the questionnaires, as well as their utilization, factors which favour their integration, needs which have been detected with relation to the same, the availability in the institutions and the training which they have or require. The data obtained from the teaching staff has been contrasted with that from the students to discover and compare the vision that each body has in relation to the angles of study which the research is based upon.

Interviews have been used along with the questionnaires, looking for more in depth data and trying to clarify any possible limitations that these could have. The interviews carried out, in accordance with their level of structure (Denzin, 1978), could be defined as non-sequenced structured interviews, since we have started from a pre-established script, being able to modify the order of the questions in the course of the

interview with the aim of achieving greater flexibility and naturalness. Due to their level of directness, we shall consider the interviews as being directed (Patton, 1987) since despite having a list of aspects to be addressed, we were free to adapt the form and order of questions.

Both instruments, questionnaires and interviews, have passed the traditional validity processes (on content – questionnaires and semantics - interviews) and measuring of reliability (Cronbach Alpha and the Two Halves of Guttman –questionnaires–) obtaining acceptable values in all of the dimensions dealt with.

For the authorization of the samples we have to indicate that we have worked with three subject groups: teaching staff, students and institutional representatives in ICT material.

In the first case –teaching staff– we have started from a universal population conforming to all of the teaching staff contracted to the eight public and private universities of Castilla and León. Being aware of this number and their characteristics, we proceeded to a probabilistic sampling of a proportionally stratified nature with a reliability factor of 95.5% (2σ) and a margin of error of +5. On conformation of the sampling we led on to the questionnaires aimed at the teaching staff. By this means and starting from the initial sampling designed to 380 elements, we obtained a reply rate of 80%, which indicates a productive simple of 304 subjects.

For the data from the students, and bearing in mind that its function was to contrast with information obtained from the teaching staff, we opted to send the questionnaire to the eight universities for its distribution to the students. The publication of the questionnaire in magazines and/or official student bulletins has been verified, as well as the sending of the questionnaire in digital format to the institutional email addresses for the greater part of the universities. Thanks to this process we have achieved a non-representative sample of 300 elements.

The study objects of the interviews have been the institutional representatives of each university in ICT material. In this way institutional officials, related to ICT, from the eight universities of Castilla and León were invited to participate, of which six accepted.

Having collected the information, we proceeded to the analysis and triangulation of the data obtained from the teaching staff, the students and the institutional representatives. In this way the data from the questionnaires was treated by use of the statistical package SPSS (Statistical Package Social Science) in its version 15.0 for Windows, while the analysis of the informa-

tion from the interviews has been carried out with the quantitative statistical analysis software Atlas.ti 5.0, which permits cross-tabling and cluster analysis, based upon the analysis of content and the establishment of categories.

3. Results

In this section we present the results obtained in relation to the use of ICT in the universities of Castilla y León, distinguishing between the results obtained through questionnaires, from students and from teaching staff and those from the interviews carried out with the institutional representatives in ICT material. In every case we have tried to transform the information obtained to a quantitative nature with the intention of simplifying the descriptive analysis of the information collected.

3.1. General Characteristics

30.5% of the teaching staff surveyed is between 41 and 55 years old, followed by 20.5% between 36 and 40. The gender distribution is even being 49% of the sample population female. In so much as the professional category the largest groups are the university teachers with 22% and associated teaching staff with 12.3%. Behind them we find the university professors, university school teachers, assistant teachers and researchers with 8% in each case.

By subject area, the simple distribution of teaching staff is made up of 40.9% from social sciences and law, 20.9% within the areas of experimental sciences and engineering, 18.6% in the areas of arts and humanities and lastly with nearly 10% each, the areas of health sciences and exact and natural sciences. Finally, we should indicate that 56.5% of those surveyed have been in a university teaching position for between 6 and 15 years.

With reference to the students, 33.3% of those surveyed are between 18 and 20 and 30.6% between 21 and 33. In the distribution by gender, women make up 64.3% of the sample. Generally, students devoted full time to their studies (84.2%) and have no previous university degree (67%).

Concerning the point in their studies which the samples are found, 33.6% are in their second year, 20.3% are in an official master course, 13.6% are in their third course. This percentage is repeated in relation to those students who are starting their studies, while 11% are in their fourth year, 5% are doing doctorate studies and 3% their fifth year.

Lastly, in relation to the institutional representatives for ICT material from the eight universities, we

have only been able to interview those from six. Four of them are from public universities and 2 from private universities. Their positions vary from one interview to another, ranging between Vice-rector, ICT services director, data processing centre director, informatics systems administrator, ICT academia coordinator or rector's delegate for ICT, although they all coincide in the responsibility for coordinating the process of technological integration.

3.2. Questionnaire results

Data obtained from the questionnaires completed by the participating teaching staff and students related to the use of ICT are shown below.

3.2.1. Frequency of ICT use

We have investigated the frequency of ICT use by the teaching staff, both in teaching and in research. In this respect the teaching staff and students agree on indicating that the use of ICT in university teaching is generalized. 67.2% of the students indicate that ICT are always used in their classes (more than three times a week; $f=69$; 23.3%) or nearly always (between two and three times a week; $f=130$; 43.9%). These percentages are higher in the case of the teaching staff, 38.8% of whom ($f=118$) indicating that they always make use of ICT and 34.2% nearly always.

The data from the teaching staff in relation to their use of ICT in their research does not vary very much; 57.6% indicating a habitual use of ICT, and this rises to 82.6% ($f=251$) if we add those who nearly always make use of ICT in the course of their research.

3.2.2. Uses of ICT

The uses of ICT in the universities is related with the access to information (teaching staff: always+nearly always=94.4%; students: always+nearly always=48.9%), presentation and transmission of information (teaching staff: always+nearly always=59%; students: always+nearly always=61.9%), carrying out control and grading of students (teaching staff: always+nearly always=72.5%; students: always+nearly always=44.1%) and the development of communication through ICT (teaching staff: always+nearly always=90.4%; students: always+nearly always=38.8%).

In addition to these aspects, the teaching staff indicate a habitual use of ICT for intra-departmental communication (teaching staff: always+nearly always=53.7%) or for clarifying abstract concepts (teaching staff: always+nearly always=55.1%). The students indicate the teaching staff's use of ICT in the course if

their classes, as well as for sending and receiving material or work (students: always+nearly always =58.6%) and for uploading to the net support material that helps attend to the different rhythms and needs that each student may have (students: always+nearly always =43.6%).

The uses of ICT of less use are related with the teaching to the students the use of databases and specialized information services (teaching staff: never+barely ever =51.3%; students: never+barely ever =51.1%), also in applications or basic ICT resources (teaching staff: never+barely ever =37.9%; students: never+barely ever =38.1%). In the same list both the teaching staff and students coincide in indicating that they barely ever make use of ICT to make evaluations of knowledge and/or abilities (teaching staff: never+barely ever =43.5%; students: never+barely ever =39.3%) or to make demonstrations or simulations of phenomena or experiences (teaching staff: never+barely ever =37.9%; students: never+barely ever =43.2%). It is significant that an important number of students indicate that they do not make use of ICT for their tutorials (students: never+barely ever =55.9%), while the teaching staff indicate that the majority, 43% sometimes use ITC in their tutorials (once or twice a month).

3.2.3 Motives for not using ICT

To investigate the motives for which the teaching staff do not use ICT we proceeded to classify these bearing in mind the family divisions used by Cabero (2001), to which we added a new family which includes more recent resources, based on the web.

Thus we obtain based resources: media, computer and web resources based on the network or Internet.

In relation to audiovisual media resources, 35% of those surveyed did not fill in the question related to the reasons for which they do not make use of the audiovisual media available. Of the 65% who answered the question, 11% (f=69) indicate that they do not use them because they

are old fashioned, 10% (f=59) indicate the lack of adequate installations.

The item on the reasons for not making use of existing computer resources is completed by 63% of respondents. 25% of these allege that they do not make use of these facilities due the high number of students in class. Other motives include the lack of adequate installations, 14% (f=54) of those surveyed, lack of time to follow the programmes (13%) or the lack of this type of resource (11%).

Finally, the replies related to the reasons for the lack of use of those resources based on the web by the teaching staff were 56%. Of this percentage, 18% indicate the lack of use of these resources due to inadequate installations for their use, 17% (f=58) indicate that they do not use them due the high number of students who use them, while 14% indicate that they can not use these resources since they are not available and 11% state that they lack the correct training or didactic experience necessary to integrate them in their work.

3.2.4. Principal ICT used

To finalize, we have collected information about the ICT being used more frequently, both for teaching staff and researchers, in the universities of Castilla and León. A weighting was calculated with the results obtained (they were asked to state the four ICT that they used in their teaching or research, from higher to lower use), situating the ICT most used by the teaching staff as communicative tools (electronic mail, chats, forums,...) with 17.2%, followed by the resources related to the seeking of information in the internet with 16%. Behind these two, come the use of the computer in the development of teaching with 15.9%

	Teaching staff	Students
Access to information	94.4%	48.9%
Communication (electronic mail, chat, forum...)	90.4%	38.8%
Grading control	72.5%	44.1%
Presenting and transmitting information	59.0%	61.9%
Clarifying abstract concepts	55.1%	25.6%
Catching attention and motivating students	43.8%	38.8%
Uploading support material to attend to the different rhythms and needs that each student may have	43.7%	43.6%
Monitoring of activities	41.7%	41.9%
Facilitating teacher-student and student-student relations	40.5%	25.0%
Teaching the students the use of specific applications or resources related to the subject	38.9%	26.2%
Doing tutorials	35.4%	14.2%
Teaching the students the use of basic ITC applications or resources	30.7%	27.5%
Facilitating self-teaching and individualizing teaching	29.8%	22.1%
Offering feed-back	29.7%	15.5%
Teaching the students the use of specialized databases/information services	24.5%	23.3%
Demonstrating and simulating phenomena or experiences	19.9%	17.2%
Evaluating knowledge and/or abilities	17.7%	17.2%

Tabla nº 2. Uses of ICT in Universities.

and the use of a traditional means such as a projector with 13.3%.

The data shown in relation to the development of research activities do not differ too much from the previous ranking as the main ICT resources used were those related to the search for information on the Internet (28.2%), followed by the personal computer with a 25.8% and communication tools with a 22.6%. The fourth resource or group of ICT resources are Internet connections through both wired or via Wi-Fi networks, although it is well away from the others, reaching 6.1% of the answers given.

In regard to major ICT used by the students, they indicate, as essential to the development of their studies, Internet connections via cable or Wi-Fi networks

ced use (creation of material and content for ICT, development of virtual experiences,...). We can state that in the universities of Castilla and León there is a general use of basic ICT (75%), while a more advanced use is gradually coming to the fore (25%).

In this section we have collected information about the use of institutional platforms for the development of teaching. In this sense the interviewees indicate a generalization in the use of platforms in those universities which have them, 75%, while the remaining 25% indicate the lack of these resources in their centres and the lack of information on their use.

Finally we show the information collected in relation to the individual initiatives developed in each university with the aim of promoting the integration of ICT in the Higher Education institutions in Castilla and León. In this sense, a third of the answers (33%) indicate the existence of this type of initiatives developed by the teaching staff on an individual level and relate these initiatives with more advanced use of ICT, principally with the developments of platforms which promote teaching such as teaching materials to be used.

With these results we can deduce the presence of an underlying idea in the university world that considers that ICT are tools and/or peripheral resources, which tend to be used in the development of material when the circumstances permit it, but are not taken into account at the time of planning a programme and the methodology of the subject.

(24.9%), personal computer use (19.4 %), use the Internet for information search (18.3%) and to provide communication tools (email, chat rooms, forums ...), with a rate of 8.7%.

3.3. Results of the interviews

To simplify the descriptive analysis of the results obtained from the interviews carried out with those people responsible for ICT material, we proceeded to the quantification of the information through categories, using Atlas.ti 5.0. In this way we can take a general overview from the interviewees (83%) that the reduced use of the available ICT in their institution is due to the lack of dedication and/or interest from the teaching staff, as well as their lack of training.

17% of the opinions refer to a wider use of the existing ICT in the centres, although they limit this to basic use of ICT, indicating that more ambitious use, although increasing, is not extended throughout the universities.

In this way there is a division in the teaching staff's use of ICT in basic concepts (multimedia presentations, software and basic applications...) and advanced

4. Discussion

Reaching this point and bearing in mind the objectives explained, the starting questions which we presume to answer and the data supplied by the participants in the research, we are able to point out the following aspects in relation to the use of ICT in the universities of Castilla and León. However, before explaining these aspects we consider it necessary to indicate a series of limitations which have evolved in the course of the research.

Firstly, we must recognise that the planned objective of the study has had a greater complexity and amplitude than that foreseen. In this sense, virtually all of the questions that we have set pose an independent object of study for themselves. We must point out, on the other hand, how as we carried out our work with geographically dispersed and ample samples, we have had to take measures to avoid any bias that could have been introduced. However, we consider that these are minimal and in every way assumable. In this respect we have also noticed how the university teaching staff, as a rule, seem reticent to participate in surveys that have, among their objectives, the aim of evaluating

their competence and skills. The results indicate a generalized use of ICT in the universities of Castilla and León as much in teaching and research as in management and administration. Nevertheless, this use does not indicate the integration of ICT in these fields, as has been stated before, principally in teaching but also in research, the use of ICT referred to by the teaching staff, the students and the institutions indicate a basic use of the ICT: access to information, presentation of information, development of communication, control of activities; there are still great gaps in the use of ICT for activities which require a greater integration (demonstrations, simulations, collective work, evaluation, tutorial activities), which allow us to affirm the presence of ICT in teaching and research activities, but that there is still a lack of an effective integration of the same.

The data indicate that there are no big differences in the ICT and their use by the teaching staff and the students, in every case the use of a computer and connection to the web for information and communication prevailing. This data is specially relevant due to the ancient fear put forward by the teaching staff, normally digital immigrants, of making use ICT and existing ICT resources, thinking that their students, by defect digital natives, have a greater capacity for their use and could doubt their performances. We consider these technological phobias to be natural, but they should start disappearing at the same time as the teaching staff acquire greater training both in the technical and pedagogical aspects of ICT, and are conscious of the didactic capacities and competences for the implementation of ICT in their professional work.

On the motives why the university teaching staffs of Castilla and León do not make use of the available ICT, we must start by stating our coincidence with the position of Tejedor, García-Valcárcel & Prada (2009) with respect to the fact. The preconceptions that the teaching staffs have in relation to the relevance of ICT in education substantially condition their integration in the processes of teaching and learning. In this respect we have noted how in the universities of Castilla and León more than 33% of the teaching staffs use the existing technologies in a habitual manner, web-based resources being the most used. The motives put forward for the lack of use of the existing ICT are essentially related to three aspects: the lack of adequate installations that permit the use of ICT, the high number of students that form the groups and the burden effect that is assumed in their use to complete the programmes of each subject. With these results we can deduce the presence of an underlying idea in the university

world that considers that ICT are tools and/or peripheral resources, which tend to be used in the development of material when the circumstances permit it, but are not taken into account at the time of planning a programme and the methodology of the subject.

The persistence of this type of conception slows down the process of the integration of ICT in university activities, considering them to be exogenous elements, and shows us a real lack of commitment and self-criticism in relation to the integration of ICT. The absence of self-criticism and the settling of self-satisfaction on the part of the university community are the two obstacles which are blocking the processes of integration of ITC in the higher education centres of.

We state that as much from the institutional perspective as from that of the teaching staff and students, we have provided data that indicates an actual lack of penetration of ICT, and which shows up a lack of self-criticism, as much on the institutional side as on the teaching side, that can turn into the awakening of the universities of Castilla and León from their lethargy, maintaining false concepts, which they are settled in, and to be able to contribute as essential structures to the development of the academic society of Castilla and León.

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