LEARNING NETWORKS AT UNIVERSITY CONTEXT. E-LEARNING FOR "MATERIALES DE CONSTRUCCIÓN" AND "HISTORIA DE LA CONSTRUCCIÓN " SUBJECTS AT ESCUELA UNIVERSITARIA DE ARQUITECTURA TÉCNICA DE LA UNIVERSIDAD DE SEVILLA

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Abstract

Due to the requirements of the Treaty of Lisbon, of the different EU regulations and communications to achieve the main human and economic progress area in the world, it is necessary to make changes in the formative process of its main figures. In this sense, the European Higher Education Area is an opportunity for the redefinition of structures, teaching methods and roles of all of those implicated in Higher Education processes. The use of digital platforms in the ordinary Higher Education formative processes makes us wonder about the quality of the formative proposals we offer to our students.

This work deals with the study of the usefulness of ICT tools to develop innovative methodologies for "Materiales de Construcción" and "Historia de la Construcción " subjects at Escuela Universitaria de Arquitectura Técnica de la Universidad de Sevilla; accordingly, it implies a transformation process of responsible lecturers in matters such as: professional training, updating methodologies, etc.; towards University students, but also from them in order to apply technological devices in the University formative routines.

Keywords: e-learning, learning networks, research projects.

1 THEORETICAL BASIS

The European Union has initiated an awareness and assessment process of the impact of technological resources on the population. The programme *e-Learning 2004-2006* and the integration of various initiatives promoted by the European Commission are examples of this. Consequently, not a few initiatives have been developed by public bodies to encourage the effective integration of Information and Communication Technologies (ICT) in education and training systems in Europe, within and outside of official educational programmes [1]. Notwithstanding, certain structural and educational deficiencies [2] remain evident at the same time as the knowledge, competence and skills derive from self-teaching rather than from more or less regulated training processes.

De Pablos and Villaciervos [4] consider that what has come to be called the Knowledge Society or Economy is the result of a combination of four main elements: the generation of scientific knowledge, its transmission through education and training, its dissemination - to which the ITCs have contributed significantly - and its exploitation through technological innovation. Changes in the education systems at all levels, then, would seem to be in order, and more pressingly at university level with the object of approaching a global technological reality with which university students have to come to terms.

Not a few references attribute the opportunity to improve educative processes to the use of ICTs, both for students and educators [5], and even more if training is carried out in fields or activities which encourage collaboration. In this way they can become the trigger for innovation and enhancement processes [7] which redound to the benefit of the entire educational action. Colas and de Pablos [8] consider that the interactive dimension of Internet is perhaps one of the essential elements for learning; that is to say, the use of participation in social processes in the generation of knowledge. Group work can promote learning experiences in the student useful for his or her personal, social and occupational development. Dibut et al [9] point out that, through interaction and cooperation within groups, students participating in distance learning develop competencies beyond the merely cognitive

(such as critical judgement), obtain motivational support from participants in the process, acquire enhanced training in participative problem solving in addition to opportunities for various learning experiences since "...listening to a wide variety of opinions is a challenge to the student's minds..." [10] Thus "...acceptance into the group can be a very effective motivating force for innovation and cooperation since, due to their proximity to the student, group incentives can be very useful..." [11].

Virtual learning environments, sometimes described as cold in allusion to the social and relational aspects of the subjects, have proven that on the contrary they serve to bring together people from very diverse backgrounds. We should not forget the spectacular use of chat and similar audio or videoconferencing applications, wikis or the proliferation of social networks such as Tuenti, Facebook, etc., as leisure mediums amongst young people, or e-mail in the work environment. But one thing is leisure communication and another very different the development of work in collaboration with others in this medium. In this sense several works point out that the most frequented ICT resources amongst university students are websites and e-mail, to which Alfageme [12] adds word processors. M.L.Sevillano distinguishes between two clearly defined and opposed groups in relation to technological communicative resources: those who use these resources frequently, and those who do not. Moreover J. Shapiro [13] talks of "computer-supported cooperative work" as a process in which various people use technology as a resource to achieve a common goal without having to overcome barriers of time or space, claiming that "...computing provides a framework to bring heads together for common efforts, guide processes and produce results...". Thus the computer is taken to be a resource for carrying out tasks of common reflection. But this reflection has to take place in environments especially created for the purpose. This brings us to the ever more frequent use of virtual learning platforms as educational areas more and more present in institutions of higher education and their use in training departments in companies. An educational platform may be defined as a technological response facilitating the development of learning distribution based on information of a very different nature, using the communicative resources specific to the Internet, at the same time supporting collaborative learning, at any time and in any place [14].

Gallego and Alonso [15] describe various strategies for the creation of collaborative virtual environments, some of them focused on higher education, such as designing a strategy in which small work groups interchange their research and learn to work productively with new technology resources or make possible groups able to create their own "virtual community" in which to exchange all kinds of ideas or proposals. Harasim [16] also considers twelve keys to facilitating collaborative work amongst students participating in on-line education: do not give lessons (small commentaries, open or not but inviting answers from fellow students, should be used); be clear about what is expected of the participants; be flexible and patient; offer answers; refrain from overloading; supervise and promote participation; organise small groups for the exercises and assign tasks; aid the educational process; write weekly commentaries gathering information; organise the interaction; establish rules and roles and choose groups or individuals to act as moderators during the course.

The idea then is to develop areas in which real collaboration takes place, and learning networks are the ideal environment for this [17], interaction becoming the central axis which permits the students' participation in the same. Along these lines Shotsberger [18], considers that "...the literature on distance learning networks and professional development agree that interaction represents a powerful method to involve students..." Thus interaction and participation in virtual educational environments will have to be fostered through the design of activities based on questions [19], or by proposing a search for information on the Internet and subsequent communication to the rest of the group to develop participation and discussion during a task [20]; that is to say, the creation of activities designed to achieve said interaction not only due to the communication tool to which it is directed - mail, forum, chat, etc. - but also to the type of activity itself - case studies, problem solving, information search, etc. What seems undeniable is that collaborative learning developed in virtual environments requires the real involvement and motivation of the participants [21] and active learning [10], since if this is not present, learning does not take place. A well planned activity or knowledge of the computing tool is not enough. The support of the group is also indispensable to ensure the growth of the person participating in the distance learning activity. One of the conclusions reached by Bruckman and De Bonte [22] in their research on factors promoting the success of computer-assisted collaborative learning in social constructivist learning environments is that the students learn more when supported by a learning community where they can share experiences and support each other. One of their fundamental conclusions is that learning success does not depend only on the software, but also on the context in which it is used: thus we would have to take into account factors like access, the presence of expert fellow students who can support and reinforce the learning, the type of activity involved and the atmosphere of the school.

To Hiltz [23], collaborative learning means that both teachers and students are active participants in the common task of reaching comprehension and the application of concepts and techniques which characterise the content of a subject. Díaz, Catenazzi and Aedo [24] point out that "...a learning environment in which students can acquire knowledge in groups or individually, and teachers can develop didactic material and carry out monitoring of the course, is a collaborative work system." At all events there are three fundamental pillars upon which the authors agree: share, learn and communicate.

Communication between members becomes indispensable. Thus fostering communicative skills within the group is a necessary step when addressing collaborative learning, both in real and virtual environments. It is essential to take the communicative competences of the subjects into account. Thus to Turoff, Hiltz, Bieber, Fjermestad and Rana [25] the concept of collaboration refers directly to the capacity for dialogue as a tool encouraging reflection within the community, and this kind of collaboration "...allows situations in which all participants are potential contributors to the transcription of the discussion, which becomes important to the group memory. Ideally, this can be developed to the point where it becomes basic knowledge both for the collaborators and for those who use the results of the discussion..."

Studying how to integrate all these technological resources obliges us to take account of new educational formats which break the limiting barriers of curricular disciplines such as space and time, and permit open, interdisciplinary learning. New concepts of university teaching and learning arise, orientated to communication and collaboration processes, based on active learning , and all this has to be assumed in the day to day of the academic life of the university. Based on the use of concepts such as mediation, genetic methodology or the active social construction of knowledge, the analysis of technologies and their use in educational contexts takes on new perspectives [8].

2   POPULATION AND APPROACH TO THE WORK

The present work forms part of a research project in progress. In this communication we have studied the implementation and use of the Blackboard WebCT virtual learning environment system in two groups studying the subjects "Construction Materials" and "The History of Construction" included in first year studies of Construction Engineering at the University of Seville School of Technical Architecture during the 2009-2010 academic year. We intend to analyse the use made by the participants in the educational process (teachers and students) of the communicative resources of the virtual platform from the point of view of the students enrolled in these courses. For this purpose we have used a questionnaire created ad hoc and given to a total of 200 students.

The population is composed of a majority of males (64.5%), the same proportion as the enrolment in the courses involved, with age groups divided into those between 21 and 25 years (53.6%) followed by those younger than 20 (38%) and older than 25 (8.4%). The majority (71.7%) consider themselves competent in the use of ICTs. Only 21.5% consider themselves expert. Notwithstanding, 89.8% use ICTs frequently, mainly for navigating on the Internet, using e-mail, using social networks and the University learning platform. The great majority claim never to have done courses on the use of ICTs (74.7%), which coincides with the findings presented by M.L. Sevillano [3].

3   THE REDSP* QUESTIONNAIRE. TOOL FOR THE ASSESSMENT OF ONLINE EDUCATIONAL PROCESSES

The RedSP (*) questionnaire is divided into three distinct parts. Socio-demographic data and questions related to the use of information and communication technologies are gathered in the first part. These are questions intended to define the profile of the participants (sex, subjects studied, etc.). The second part is structured into five dimensions treating the main elements involved in the teaching-learning process: *Dimension 1*: role of the teacher; *Dimension 2*: role of the student; *Dimension 3*:

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* This questionnaire was drawn up by Miguel Ángel Ballesteros, Lecturer in the Department of the Theory and History of Education and Social Pedagogy of the University of Seville. Lecturers Juan Jesús Martín del Río y Francisco J.Blasco López of the Department of Architectonic Constructions (II) of the University of Seville also collaborated.

performance in the virtual activity and the role of the assessment; *Dimension 4*: the use of the ICT tools; *Dimension 5*: communication.

In this second section the items are presented as statements to be assessed following a Likert-type scale of five options "strongly disagree" (valence 1) to "strongly agree" (valence 5) with which to assess the aspects of the integration of ICT resources in the learning process.

The third section consists in another Likert-type scale going from "very bad" (valence 1) to "very good" (valence 5) also of five options where items related specifically to the assessment the users make of the platform used during the course.

Although this is a questionnaire the object of which is to collect information and not so much to obtain a normalised measure, an analysis of the psychometric features has been carried out. On the one hand the internal consistency has been analysed using the Cronbach alpha procedure, and on the other the structure of the two Likert-type scales has been subjected to an analysis of main components. The scale of the second section obtained a Cronbach alpha of 0.89. This value increases to 0.90 eliminating item 54. The scale of the third section obtained a Cronbach alpha of 0.79. A slight improvement to 0.90 is obtained if item 1 of this section is eliminated. In relation to the latent structure, a principle component analysis was applied to the second section. The statistics package SPSS [26] was used to apply a varimax rotation.

The principle components analysis with varimax rotation applied to the 70 items of the second section of the questionnaire suggests 22 components, which explains the 72.63% of total variance, with a first component explaining 16.59% of this variance. Due to the high number of components, a new analysis was carried out limiting the number of components to 5 (see the pre-established structure of the questionnaire below). The results are presented in the chart below. In this sense dimension 5 "communication" is clearly endorsed (18 of 23 items) by the explanation provided by the statistical data corresponding to component 1 *communication and collaboration online* extracted from the variance analysis.

4   RESULTS OBTAINED

4.1   On the role of the teacher

On assessing the teacher, 48.8% of the participants usually consider him/her to be an expert in performing the tasks, although they consider the role to be more that of a guide than an expert. Along the same lines we find the students' perception of whether the teacher is an expert in the use of ICT tools or not. While 48% think this is true, 43.4% consider they do not have sufficient information on the subject and answer "Do not know/no answer".

Amongst the tasks attributed to the teacher by the students is explanation of course content, and that the teacher is in the end the person responsible for the teaching materials (item 26). Another of the tasks attributed to the teacher is assessment (43% of the participants chose option 4 and 31, and 28.5% option 5). The teacher's role as guide(72.2%), more than as an expert (55%), is also valued positively. The students recognise the work as a guide in that when they have experienced difficulty using the platform they have not been alone but supported by the teacher of the subject (63%). With reference to the methodology employed, practical cases and problems have been used as the main content of the platform (77%). The participants consider that it is not the teachers who have the correct solution.

74.7% consider that the teacher used the resources of the platform well. They consider, however, that teachers used the communication tools integrated into the platform with varying intensity. While the majority understand that the forums were not used to increase motivation, the agenda of the platform was used to keep the students informed on questions relating to the subject (42%).

4.2   On the role of the student

The majority of the students consider that they themselves are responsible for their education (59.7%) and thus are not mere receptacles of information (55%). In fact, 45% consider that they have the possibility of making contributions to the contents of the course. However, it is no less significant that 30% reply "do not know/no answer" to this question. At all events there is no unanimity in relation to whether course content is open to contributions by the students. However, the students participating in the study declare that they did not contribute complementary documents in the performance of tasks

(65%) or generate contents on the basis of the presentation of the learning situation by the teacher responsible for the subject (44%). Likewise, assessment falls entirely on the teacher (58%) and there is no assessment of fellow students (item 12).

In the same sense as mentioned earlier, aid between fellow students does not seem sufficient (item 29). In general the students consider themselves inactive in the use of the communication resources as can be seen in items 38, 39 and 40. In general there is no clear agreement on how the students perceive that their work is faithfully reflected on the platform. While 38% consider that this is so, 35% is unable to take up a clear position on this question.

It appears that the appreciation of the students on the opportunities for group work is fairly heterogeneous and there is no clear position in this respect. It depends more on the students' interpretation than on the real existence of opportunities for collaborative work. If 47% consider that the tendency is towards individual effort, 32% express the opinion that opportunities for group work do exist, and lastly 30% have no opinion on this question. However, it is curious to note that the students feel supported by their fellows in the face of possible difficulties in the execution of the tasks (71%).

Participation in the various communication tools integrated into the platform, mainly the forum (12%) and the chat (11%) is limited, no matter who proposes it, fellow students or teachers. In fact they do not clearly observe that virtual communication influences real communication. The resources, according to the majority, are open to the students although there is no unanimity on this point. They feel supported in the execution of tasks through the forum (35%) but at the same time do not think they help their fellow students (59%). They recognise the flexibility conceded by teachers to create their own forums and chats (51%). However, utilisation of this is partial and, according to students' answers, they are not capable of attributing it a real value in the teaching-learning process: sharing concerns, solving problems, clarifying doubts, etc.

4.3   In relation to virtual activity and assessment

The students consider there is little room for creativity in their educational process (46%) and this may be a de-motivating factor. In fact they consider that assessment basically depends on reproduction of content proposed by the teacher (59.1%). Although a slight majority (46.3%) consider that the platform is not used to work in small groups, they value the work done on the network positively (41%).

One curious data is that only half the people questioned say that the working methodology of the subject consists in the analysis of problems and cases. This question seems to point to methodological differences in the teaching of the subjects, which necessitates a second analysis of the results found in the questionnaires.

The participants in the study address problems by searching for information by their own means before consulting fellow students (46%) or teachers (50.6%). They prefer to consult teachers (59%) in preference to their fellow students. E-mail is the means preferred by half the participants (50.6%) as against other communicative resources available on the platform (22%). There is a certain rejection of the forum as a means of consultation (items 35, 36, 61 and 62).

4.4   On the use of ICT tools

The students do not use the platform as a mere repository for documents, but more to carry out activities in the subject. However, this idea is not a generalised one since the percentages are fairly similar between those who see it as a "virtual copier" (40.6%) and those who do not (42.5%) In general the use of the platform adds value to the subject recognised by almost all the participants (86.6%). Assessment of the group in relation to the platform and its impact on learning is positive (68%): as an area to carry out activities (62%); in which to share and collaborate with others (47%); where content was basic to the development of the subject (78%); creating positive expectations towards the material (67.3%); facilitating the acquisition of digital skills (52%) and favouring comprehension of the content and fulfilling expectations (80%). In general the platform met the expectations of use of the participants (72%).

If the content offered online was object of comments during real classes (73%), it seems that the debates carried out on the platform did not have an impact on real interaction for at least 50% of those taking part in the survey. It would have added more value to the content offered had it included work or activities from previous years which could serve as examples for the students studying the subjects included in the course.

4.5 The role of communication

In relation to the use of the communicative resources available on the platform we find that there is a very heterogeneous assessment on behalf of the participants. Apart from facilitating communication with the teacher through the use of e-mails (56%) or with fellow students (48%) other resources were not used. The assessment, for example, on use of the forum is somewhat disconcerting: on the one hand it did not seem to favour common reflection since the participants are unable to answer affirmatively or negatively in this respect, nearly half (46%) adopting a clearly neutral attitude. On the other hand the answers are polarised into two groups, one which used this resource to carry out tasks (43.6%), and others who did not so use it (35%) and one group of those who discovered new aspects in the tasks proposed within the subject (33%) and others who did not (36.4%). A similar result is found on the use of the chat in both subjects. Here too the answers are polarised. While for some it was useful as an aid to carry out tasks (32%), a similar percentage found that this was not so (38%). It seems that the use of this resource did not have a positive effect on the explanation of certain tasks for almost half the participants in the survey (44.5%). The case of use of the agenda is the complete opposite to that of the chat or forum. Here almost half the population of the survey (44%) considered this communication resource to be useful in the process of organising and planning the tasks proposed in each subject.

It should be added that, in the case analysed, the use of virtual communication tools did not facilitate communication amongst students who had not had dealings with each other in class (44.2%).

4.6 General assessment of the platform

In general the assessment of the students in relation to the use of the platform is positive. The platform used (WebCT) in both subjects was assessed as a suitable learning tool. Participating students valued positively (option 4 "good") the treatment given in both subjects to various aspects of the educational process such as the content offered (57.6%), the structure of the platform (59.4%), the design accessed by the students (51.5%), the tasks proposed on the platform (53%) and the use of the platform e-mail (40.5%).

ITEM	1	2	3	4	5
1.- Contents proposed		3	10.9	57.6	28.5
2.- Content structure	0.6	6.1	7.3	59.4	26.7
3.- Design or interface	0.6	12.3	12.9	51.5	22.7
4.- Use of platform e-mail	3.6	21.8	23	40.5	10.9
5.- Topics proposed in the forum	11.6	20.1	43.3	20.1	4.9
6.- Communication dynamic established in the forum	11	17.2	41.1	26.4	4.3
7.- Use of platform chat	12.7	24.2	44.2	15.2	3.6
8.- Topics proposed in the chat sessions	12.7	25.5	43	14.5	4.2
9.- Communication dynamic established in the chat sessions	15.5	19.9	49.7	11.8	3.1
10.- Online tutorials	7.3	20	38.8	23	10.9
11.- Tasks proposed on the platform	3	6.1	14.6	53	23.2
12.- The platform as a learning tool	0.6	3	6.1	33.9	56.4

Table 1. Percentages which reflect the assessment of the ICT resources employed in the subjects "construction Materials" and "The History of Construction" included in the 3rd section of the questionnaire.

However, we find that the participants fail to assess the communicative resources integrated into the platform (forum, chat and online tutorials) 40% of those surveyed choosing the "do not know/no answer" option. The most evident case is that of use of the chat sessions where 50% fail to offer an assessment and 35.4% assess them negatively in both subjects. The data suggest revising, from the methodological point of view, the use of the resources directed towards communication included on the platform; that is to say how to employ the resource in an efficient and motivating way for students. It is worth asking whether these resources have supported the educational process or if they simply represented available elements for which no learning activity was designed. This does not seem to be the case as the tasks proposed on the platform were positively assessed (53%).

5   CONCLUSIONS

The present work has had the effect of raising many more questions than we had considered at the beginning of this communication. At the same time it has confirmed some of the conclusions arrived at by other authors such as Sevillano [5] in relation to the use of certain communication resources in online education. It also helps us to rethink the question of not asking only about the content proposed in this work - the application of ICTs in educational processes in the University - but also about the methodological and research process to carry out.

On the one hand we find a central tendency in many of the items proposed in the questionnaire. On occasions positive, negative and neutral assessments are distributed almost evenly. However, the reliability levels of the questionnaire were high. This question has raised the need to carry out much more detailed analyses with respect to the responses of each group, relating their answers to the methodological approach and the features of the teacher responsible for each subject. This will allow us to establish comparisons between the two groups.

The harnessing of the ICT resources available on the platform does not appear to be the most suitable in the courses and subjects analysed. It would have been advisable to include learning activities integrating the various communication tools. In this sense it seems to be a matter of priority in the groups object of our study to clarify, in a manner integrated with the task it is intended to develop, the reasons for the use of each communication resource, attributing value to online participation and the adoption of proactive attitudes on the students' part. Students should be given the opportunity to participate actively in the teaching-learning process (proposals for forums, chats, contribution of complementary material, participation in self-assessment processes and assessment of fellow students etc.). We believe that the use given to the communication resources was not suitable to fostering the kind of collaborative work specific to working networks. However, we consider the experience to be a valuable one since it endows both students and teachers with ICT competences and knowledge of the incorporation of these resources into academic life. All this would be possible if some of the suggestions of Gallego and Alonso [15] o Harasim [16] are incorporated.

All the above considerations lead us to consider the need for teacher training in the specific didactic methods for the design, development and assessment of online (or more precisely blended learning educational programmes, since the University of Seville is an institution which incorporates ICTs as support for educational processes carried out in the real classroom).

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