ICT USE AS A DETERMINANT FACTOR IN STUDENTS' SATISFACTION AND SKILLS DEVELOPMENT
A New Model for the New Higher Education Context

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Abstract: The important changes in learning methodologies in the context of the European Higher Education Area (EHEA) improve new educational methods. Therefore, the use of information and communication technologies (ICT) and their application in the new higher education model are considered as the background to student satisfaction and their development of generic and specific skills for professional results after graduating. This paper, firstly, provides an analysis of the expectations of a sample of second course undergraduate students in the business and management area (University of Seville, Spain). Secondly, it analyzes a causal model related to the use of participative teaching methodologies, perceived institutional support, and the ICT use in the teaching-learning process, as determinants of students' satisfaction and skills development in the context of the EHEA. The results of the descriptive analysis showed that students consider the use of specific materials and the use of e-learning platform to be important. The contrast with the estimation of the structural equations model and the results were satisfactory. Finally, the paper proposes some indications for higher education institutions and educators to further the right adaptation to the new context of the European Higher Education Area; for example, institutional promotion of learning technologies (e-learning instruments), training programs in ICT and teaching innovation.

1 INTRODUCTION

The context of university teaching and management is the result of numerous changes in past decades. The quantitative and qualitative increase in the university offer in the 80s meant a growth in the number of students and professors, as well as the incorporation of new study plans adapted to the technological, cultural and social changes. The new university management model in the 90s was the paradigm of the quality improvement of the teaching service. Concepts of business management were adapted, such as continuous improvement, process assessment and quality standards. The 21st Century has begun with the process of convergence towards the European Higher Education Area (EHEA). This context means that important methodological changes, the involvement of the university institutions and the development and use of information and communication technologies (ICT) have become key elements to achieve success in the teaching-learning process. As Hernández, González and Guerra (2006) remark, this change in the EHEA is, mainly, a cultural change, a new vision of the professor-student relationship that implies a conception of learning in higher education in line with the changing demands of the labor environment and a new model of university management.

Currently, having surpassed the first phase of adaptation towards European convergence, the broad offer of Degree studies in Spanish universities has us facing the need to reflect about how these changes will be met with and adopted in the university context during the next decade.

This convergence framework does not mean homogenizing curriculums or procedures but rather

the abilities and the skills that are characteristics of each degree (Fernández, Suárez and Villarejo, 2008). This is why each university has tried to develop plans and strategies that are coherent with their socio-educational and professional realities (De Miguel, 2005a). The key to the success of implanting Degree studies can therefore be in detecting those needs and in adapting the new study plans to the achievement of the specific skills and the accomplishing of the students' expectations in the socio-professional placement that they will experience in the 21st. century. A high satisfaction level as a student and as a graduate will then be attained. Yet, as Correa and Paredes (2009) remarked, Spanish universities do not always incentivize the teaching staff taking part in processes of transforming their methods, which is why the need for a change in the teaching training model has been detected. This implies real adjustments towards more participatory methodologies.

On the other hand, learning with these characteristics requires methods that favour reflection about what is done, how it is done and what results are achieved. The students will in this way be able to use this as a strategy to improve their own performance, thus developing the most complex competence of all: that of learning how to learn with a critical sense (Fernández, 2006).

As is logical, insecurity and uncertainty have appeared in the renovation process in the university area. This has been particularly so when they are linked to a change that has the scope of the adaptation to the new pedagogical methods and a new philosophy of university teaching (Monereo y Pozo, 2003; Álvarez y Pérez, 2004). All this is immersed in a framework of the students' delocalization and globalization (Mavondo, Tsarenko and Gabbott, 2004) and the multiculturality of the educational communities at which it is aimed (Castells 2000a; 2000b). Also, constant ICT development is opening routes to disseminate information and generate new learning modalities, but it is also opening digital gaps of varying importance between the students, the professors and the university administration staff (Área, 2000; Cabero, 2000; Zabalza, 2002).

The main aim of this current work is to analyze the students' perceptions about their university experience in the new Degree study plans and the incorporation of new didactical methods, the involvement of the university institution and ICT use as a tool in the teaching-learning process. All of this is from the students' perspective: accomplishing their expectations with the satisfaction level and the skills development needed in their future professional work. This general aim can be specified in the following particular objectives: (1) to detect the methodology that the students consider should be the aim of preferential attention by their class professors and how knowledge and the assessment process should be acquired; (2) to explore the degree of ICT use by the teaching staff; and (3) to analyze the influence of the institutional support, the teaching methodology and the ICT use on the satisfaction and learning of the university student, both of them within the framework of the change of the teaching-learning process design model with respect to the traditional method of higher education (Fernández and Cabreiro, 2003).

2 RESEARCH METHOD

To attain these aims we have carried out an empirical study whose target population is the current second year students of different social sciences Degrees that are taught in the faculties of the University of Seville. The information gathering was carried out during the beginning of the 2010-11 course via an own questionnaire in which previous research was taken into account (De Miguel, 2005a; 2005b; Fernández *et al.*, 2008).

The final sample is made up of 402 valid surveys. The information from the sample has been analyzed via the statistical software *PASW 18*.

2.1 Characteristics of the Survey

In the questionnaire we included an initial block of variables that allows us to identify the most relevant characteristics of those who make up the sample. Specifically, we know the gender, age, marital status, type of High School and the average marks achieved, the degree of command in computer studies and their main software applications, the availability of a computer in the home and Internet access and the average time of daily computer use, both for study and leisure. The sample was extracted from undergraduate students of EHEA degrees. They are of an average age of 19.9 years, 54.7 % are female, 66.6 % studied in state schools and had Good or above in High School grades. The great majority of them (95.3%) have Internet access at home, and they mainly use the *Microsoft Office* pack. 68.4% of the students spend more than an hour per day on Internet-leisure, and almost half of the

sample spends more than an hour per day on Internet-study.

2.2 Basic Descriptive Analysis

The variables were analyzed via reflective indicators measured on the Likert 1-5 scale (*1 - strongly disagree; 5 - strongly agree*).

We can see that the main perceived institutional support is the promoting of virtual communication through web pages and virtual teaching platforms (68.2%). To a lesser extent (40.2%), the students consider that this support simplifies administrative tasks. However, a great number of them reckon that institutional support does not sufficiently respond to their study needs, training, exchange programs and internships; nor does it cover their communication and information needs either within or outside the institution.

We analyze the main concerns of professors in the organizing of classes. Students have shown a great interest in the teachers' orienting towards comprehending the contents they transmit and encouraging the students' interest in their subjects. On the other hand, students give less importance to the fact that the professors foster their taking part in classes and make them responsible for the learning process.

Regarding the resources they consider the teaching staff should use, the students prefer specifically-prepared printed materials to other types of support materials, both the classic ones and those connected with new technologies. 24% of the students do not consider the use of the books of publishing houses or the teachers' recommendation of them to be relevant.

With regards to the professors' means for knowledge transmission*,* more than 70% have shown an interest in the development of cases and simulation activities and class notes. They show a strong disinterest in traditional oral presentations, but also in methods linked to bibliographical investigation and self-learning. Nor do they give much importance to the organization of debates and work preparation, be it individual or in a group. Finally, the majority of the students (75.2%) consider that when marking the diverse materials, the professor should take into account the quality of the work carried out. What's more, it seems important to them for the level of knowledge attained in connection with the aims set out to be valued. The quality of the answers in oral tests (60.4%) and taking part in class and set activities (62.2%) has a lesser importance. The least valued

assessment systems are classroom tutorials and argued self-assessment: less than half of the sample does not consider them of much importance.

The assessment of the students about ICT show that the effects most valued by the students are associated with the better quality of access to the didactic materials and the disposition of better information access channels. The students give less importance to the possibility of the teaching staff orienting and following up the work carried out thanks to ICT, and the development of search and information selection skills. The least valued effects are associated with the possibility of generating contact and debate networks from virtual communities and the chance of increasing the student's interest and motivation. Lastly, we analyze the difficulties that students perceive in the teaching staff's ICT use. The factor that is considered to be most relevant, though for less than half of the sample, is the low training level perceived in the teaching staff when they use new technologies. On the other hand, a majority consider that the technological resources are available and adapted for their use in teaching.

3 THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

The interest that the teaching staff shows in fostering the students' communication and participation and promoting their responsibility in learning are key aspects in the skills that, once the years of study have finished, these students will have obtained (Fernández *et al*., 2008). To achieve the students' participation via interaction with the teaching staff and with their companions favors their satisfaction level (Fredericksen, Shea and Pickett, 2000). A systematic teaching methodology that is intentionally organized to favor participation even it does not directly promote learning does favor the probability of this taking place (De Miguel, 2005b; 2009). What's more, when the development of skills linked to higher teaching aims such as the development of critical thought and autonomous learning is sought, methods centered on the students are more appropriate and efficient (Fernández, 2006).

As Fernández (2006) remarks, skills training even brings about the students' contact with the social and professional contexts in which the future graduate will perform. It also fosters the capacity to

learn with others, encouraging team work to exchange ideas, opinions, points of view, etc. The use of participatory teaching methods therefore means the possibility of developing the abilities and skills necessary for the university leaver in their professional career (Villarejo, Fernández, Suárez, Sánchez and Álvarez, 2010).

As a consequence of what has been presented, we can put forward the following hypotheses:

- *Hypothesis 1a*: Participative learning methodology proposed by the professor in the classroom has a direct and positive impact on students' satisfaction.

- *Hypothesis 1b*: Participative learning methodology proposed by the professor in the classroom has a direct and positive impact on the skills the students acquire through their academic training.

As well as the aspects referring to the use of the most appropriate methodologies, we must study the influence of the institutional support received during the period as a university student. The students' satisfaction is at times determined by multiple factors connected with the institution, such as the professors' level of preparation, the teaching styles proposed and even the support for research (Appleton-Knapp and Krentler, 2006).

Currently, universities need to implant *e-learning* systems, virtual campuses and *blended learning* to develop teaching practices in which research communities take part (Bonk, 2003; Anderson, 2004; Correa and Paredes, 2009). Moreover, the university institutions will be the ones in charge of fostering the working out of training offers. These are aimed at the teaching staff in order for them to acquire the skills that are necessary for them to attend to the new needs of Degree students and facilitate the resources needed to carry out these changes effectively (Álvarez and Romero, 2007).

In previous studies (Fernández *et al.*, 2008; Villarejo *et al.*, 2010) it was shown that: (1) to favor virtual communication via on-line teaching platforms; (2) to facilitate access to carrying out internships promoted by the University; (3) to encourage mobility and exchange programs with other universities; and (4) to simplify administrative tasks are matters that can influence the satisfaction levels attained by the students as well as the skills that they finally acquire. We propose the following hypotheses as a consequence of this:

- *Hypothesis 2a*: The institutional perceived support that students receive during their university stay has a positive influence on their greater satisfaction.

- *Hypothesis 2b*: The institutional perceived support

that students receive during their university stay has a positive influence on the skills that they acquire.

Additionally, ICT use in university teaching is a basic element of differentiation, compared to the traditional system that bears witness to the convergence of the teaching activity and the technological advances present in society (Área, 2000; Cabero *et al.*, 2003). Likewise, as in the previous descriptive analysis, students' familiarity with ICT is high and their expectations about training in the handling of them once their university studies are finished are also high. Technological skills and abilities are evident even in studies among pre-University students, in which a direct relationship is observed between ICT use and the development of specific skills in the subjects taught (Oliver and Corn, 2008). Therefore, the active learning methodologies using ICT have a positive influence on technological skills development, such as the use of Web 2.0 tools by students (Guerra, González and García, 2010).

However, and as Correa and Paredes (2009) pointed out, incorporating ICT into university life has fostered an important change in resources and infrastructures. Above all, it has modified the management and academic organization model, though this change has been less in teaching innovation. So, for students to satisfy their training expectations, university professors must use different technological resources to those that they dispose of to give their classes. This will require the teaching staff to control and handle ICT and renovate certain methodological aspects that this new form of teaching entails (Añel, 2008). Nevertheless, the professors are not in all cases prepared or accustomed to the use of these technologies available in their centers (Cabero *et al.*, 2003), especially when some studies show a difficulty in the teaching staff's ICT acceptation and use (Mahdizadeh, Biemans and Mulder, 2008).

Our proposal thus sets out the following hypotheses:

- *Hypothesis 3a*: The degree of the professors' use of ICT has a positive influence on the students' degree of satisfaction.

- *Hypothesis 3b*: The degree of the professors' use of ICT has a positive influence on the students' acquiring of skills.

Students' satisfaction increases to the extent that teaching methods based on inter-disciplinarity are favored [*inter-professional* education (*IPE*); Barr, Ivan, Reeves, Hammick and Freeth, 2005].This entails an improvement in learning and putting it

into practice in the future professional work (Curran, Sharpe, Forristall and Flynn, 2008). What's more, and as Mavondo *et al.* (2004) pointed out, ICT use as a source of students' satisfaction provides them with the possibility of getting to know and trying out hardware and software that can encourage the development of skills needed in their professional work. Finally, let us consider that skills development can be influenced by the satisfaction level attained by the student:

- *Hypothesis 4*: The student's satisfaction experience has a positive influence on the acquiring of skills.

In the conceptual model (Figure 1), we set out relationships between the variables analyzed by our work. The aim of this is to favor recommendations for professors that may bring about a better perception of the teaching quality and the achieving of students' skills and abilities. Its contrast is carried out through a system of structural equations, using the statistical pack *SmartPLS 2.0*. The hypotheses set forth are of an exploratory nature. This is because their contrast gives rise to a more accurate knowledge of the relationships between the behavior of the professors, the institutional support and the students' satisfaction and learning that will orientate future research in an area that has not, until now, been the aim of many studies.
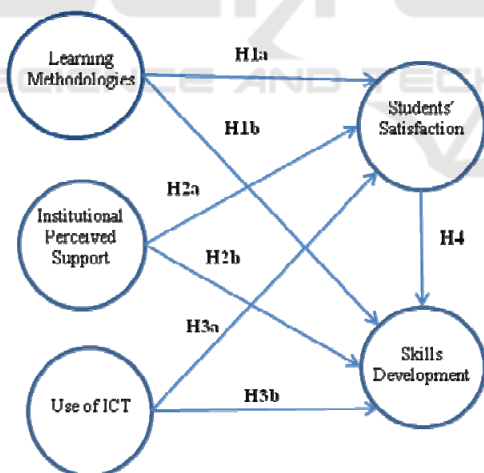

Figure 1: Causal model

4 DEVELOPMENT OF THE MODEL

As a previous step to their use in the causal model, we have assessed the reliability and validity of the scales that make up the measurement model. Initially, all the items in the questionnaire for the

five constructs of the causal model were considered. Nevertheless, an exploratory analysis showed the need to eliminate some of them to optimize the making up of the scales. When assessing the suitability of eliminating some of the initial items, we have taken into account the value of the Cronbach α coefficient, noticing, when its value was less than 0.7, its improvement in the case of suppressing some of the items.

Regarding the constructs ICT use and skills development we have opted for keeping items with values between 0.6 and 0.7 in their individual reliability, with the aim of not losing information. We checked that keeping them did not have a negative repercussion on the reliability of the construct measured. Throughout this process we used the statistical packs *PASW 18* and *SmartPLS 2.0* (Ringe, Wende and Will, 2008).

4.1 Reliability and Validity of the Measurement Scales

We based the individual reliability of the scales (Table 1) on the correlation coefficients of the items with the total of the measurement scale and the compounded reliability index. This must reach a value over 0.7. For each of the measurement models, the correlations of each indicator with the total of the scale satisfy the levels required, above 0.6 (Bagozzi and Yee, 1988). Advancing in the analysis of the psychometric properties of the scales, we went on to study their validity. The validity of content is accepted: the scales were designed from attributes contained in measurement instruments validated in previous studies.

Table 1: Convergent Validity.

CONSTRUCTS	AVE	Composite Reliability	Cronbach's α
IPS	.5577	.8345	.7372
SS	.5864	.8501	.7659
ICTU	.5608	.8355	.7359
PLM	.5323	.8501	.7799
SD	.6432	.8780	.8153

To check the convergent validity, we saw that the reliability of the constructs and their average variance extracted are over the recommended values of 0.7 and 0.5, respectively (Carmines and Zeller, 1979; Fornell and Larcker, 1981). It was also seen (see Table 2) that in all the constructs the reliability index measured via Cronbach's alpha is high, surpassing the 0.7 required in exploratory research (Cronbach, 1970; Ninnally, 1978).

Table 2: Individual Reliability.

PARTICIPATIVE LEARNING METHODOLOGIES (PLM)		**.8501**
Try to understand the contents transmitted	.7637	
Encourage students' interest in the subject(s)		
Foster students' communication and participation	.8539	
Stimulate students' responsibility for their learning	.8093	
PERCEIVED INSTITUTIONAL SUPPORT (PIS)	.7781	
Gives an answer to my needs concerning studies, internships, training, exchanges and so on	.7399	**.8345**
Covers my communication needs – information within and outside the institution	.7592	
Simplifies administrative tasks (there are support documents, data bases, etc.)	.7479	
Favors virtual communication (Web CT, domain us.es, etc.)	.7399	
ICT USE (ICTU)		
Projection systems (Rear projection of slides, video-projector, etc)	.7813	**.8355**
Computer, canon or multimedia systems		
Internet and telematic systems	.8211	
Virtual platforms (Web CT, etc.)	.6740	
STUDENTS' SATISFACTION (SS)	.7103	
The relationships that I establish		**.8501**
The interest shown in my speeches, in the classroom, in the net and so on	.7734	
The quality of the work and the tests that are set	.7656	
Passing the subjects based on the set criteria	.7801	
SKILLS DEVELOPMENT (SD)		
A better quality of access to the didactic materials	.7436	
An increase of our interest and motivation		**.8780**
The development of search and information selection skills	.7620	
The possibility of solving doubts about the program and the subject in the most efficient way	.7670	
A good enough command of ICT to apply them in my professional field	.7501	
	.7040	
	.6590	

To set up the discriminant validity, the AVE value must be above the variance shared between the construct and the rest of the constructs represented. For suitable discriminant validity, and to simplify the comparison, each element of the main diagonal (the square root of the AVE) must be above the remaining elements of their corresponding row and column (correlations between constructs) (Barclay, Higgins and Thompson, 1995). In the model set out, the constructs satisfy the condition imposed, which leads us to accept the discriminant validity, as we can see in Table 3. Once the suitability of the measurement model scales has been checked, the next phase of the empirical study is the estimation of the causal model to contrast the hypotheses set out.

Table 3: Discriminant Validity.

	PIS	SS	ICTU	PLM	SD
PIS	**.7467**				
SS	.4179	**.7657**			
ICTU	.4051	.4342	**.7488**		
PLM	.3258	.2518	.2751	**.7295**	
SD	.4446	.5349	.4512	.3542	**.8019**

4.2 Contrast of the Model Set Out

Through the development of a system of structural equations, we have studied the relationships between the latent variables, the estimation of the parameters and their level of meaning (see Figure 2). We can accept five hypotheses set out in the model: *H2a*, *H2b, H3a, H3b* and *H4*. However, the relationships between participative learning methodologies and students' satisfaction and skills development, have not been able to be accepted due to the lack of significance of the relationship with the confidence level required.
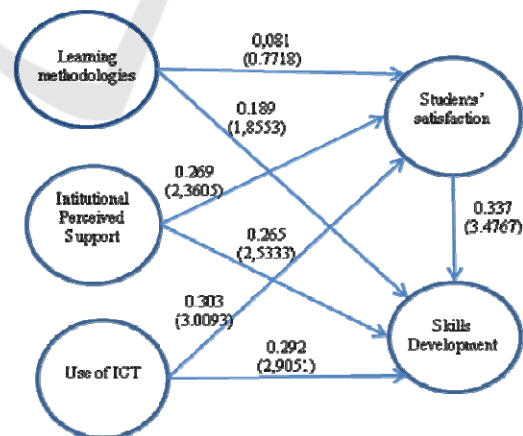
Note: t-value in brackets. Based on $t_{(499)}$. Two-tailed test; $t_{(0.05; 499)} = 1.9635$; ; $t_{(0.1; 499)} = 1.6479$

Figure 2: Results.

From the contrast of the model, we highlight that the participatory methodology does not affect the students' satisfaction. This is justified because the

students perceive that the methods directly affect their learning and skills development. The students consider that the teaching activity serves to generate and develop skills and abilities.

Institutional support directly affects the students' satisfaction (*H2a*). This reflects the need for institutional support for the adaptation to the new EHEA as a priority of university institutions: directly or indirectly, it influences the development of the students' competences and skills through satisfaction (*H2b*).

ICT use significantly affects the students' satisfaction level (*H3a*), which corroborates the importance that Degree students give to new ICT in carrying out their work as students. ICT use in teaching directly and significantly affects the skills the student acquires (*H3b*). Fulfilling this last hypothesis serves to emphasize that students' learning in the context of university teaching is linked to the personal characteristics of the teaching staff. That is, their personal disposition and interest shown in ICT use, as well as the level of use of resources linked to ICT in teaching.

Finally, the students' satisfaction positively and significantly influences the development of their competences as university students (H4). This is justified by the fact that the students find, in the satisfaction of their needs, a possibility for the development of their skills needed for later professional work.

To sum up, the results of our research allow us to accept the positive influence of perceived institutional support on the students' satisfaction level and the development of their professional skills in the study area. Likewise, we can establish the positive influence that ICT use in university teaching has on the satisfaction level attained by the students in their study period and on the development of their skills for their future professional work. However, the positive influence of the use of participatory teaching methodologies on students' satisfaction or on the development of their skills is not accepted, though the latter could be accepted as significant for a lower confidence level. Finally, the satisfaction attained by the student favors the development of their skills.

5 CONCLUSIONS AND SOME PROPOSALS FOR IMPROVEMENT

As a result of the exploratory study carried out, there

is a series of contributions related to the students' perceptions that we consider relevant:

- The importance of perceived institutional support for the development of their university activities. They have shown a special interest in the development of techniques that favor virtual communication through e-learning platforms (Bonk, 2003; Anderson, 2004). This is the result of a growing interest of the universities in involving themselves in the adaptation process towards European convergence and the favoring of a more participatory teaching.

- The students give great importance to the concern shown by the teaching staff in the development of the training activity. They consider that it is very important to encourage interest in the subjects and to favor the communication and participation of the students. This is why they prefer specific materials for the subject and more practical classes via the use of cases and simulations.

- On the other hand, the professors do not show a special interest in the development of new teaching methodologies that substitute more traditional methods. Indeed, the students have shown little interest in self-assessment and assisting tutorials as assessment mechanisms. This leads us to think that the teaching staff will need to not only adapt their teaching methods to the new demands of the EHEA, but also take part in the design and use of these new methods to get more out of their work.

- The students' valuing of the lecturers' ICT use is especially favorable when it has a positive influence on the possibility of accessing to information or problem solving. However, they do not perceive that much importance is given to their motivation, the generating of networks of flexible contacts or the setting up of virtual learning communities. These aspects mean an important lack for students who find themselves, beginning a university career in which they are starting to build their own systems of relationships. We add to this the importance that students give to the low training level for ICT use that they perceive among the teaching staff (Cabero *et al.*, 2003).

- The students are not very satisfied with the interest that the teaching staff shows in their participation in the classroom and online as well as the quality of work and tests that the professors present in the development of the teaching-learning process.

In a previous paper (Fernández *et al.*, 2008), we analyzed the perceptions of students from two Spanish universities about the educational methodology used, as well as their opinion about the

possible aspects of ¿es un "the"? improvement in the ICT use. Establishing comparisons between the expectations of the present and previous studies related to the management and business area, the results have shown that the EHEA students give less importance to ICT use in learning methodologies and they think that professors have a good level of access to ICT and consider that they are trained in their use.

From the analysis of the causal model, it emerges that institutional support is important to achieve the adaptation of these new systems and the involvement of the university institution and the teaching staff in the setting up of new methods adapted to the new technological environment (Ávarez and Romero, 2007). This perceived institutional support positively affects the students' satisfaction level and the possibility of developing the specific and generic skills necessary for their professional work after graduation.

ICT use in teaching favorably affects the Degree students' level of satisfaction and the development of their professional skills. We must, however, pay special attention to this point as the restructuring of the educational and training systems may not be enough. Especially so when the ICT development programs in university training are only centered on technological aspects (Gromaz, Rodríguez and García, 2008), thus abandoning the true methodological character that the teaching-learning process should signify. In this sense, an efficient ICT use by the professors depends on, amongst other factors, the talents and skills that they devlop (Martín-Sobrado, Ceinos and Fernández, 2010).

Due to all this, with regards to the university institutions and from the perspective of the teaching staff, it seems necessary to develop: 1) institutional policies to promote and deploy technological infrastructures and ICT access ; 2) spaces for personal and cooperative work, bearing in mind the communication tools available via ICT–mails/ emails/ notice boards and messages, forums and chat groups, videoconferences, and so on; 3) systems of inter and intra-institutional information dissemination ; 4) training models paying attention to the indicators diagnosed, taking into account the most deficient projects, areas and variables ; and 5) stimulating change processes oriented at reducing the digital gap in the teaching sectors that are least adapted to ICT use, as well as processes associated with the use of technologies to improve teaching in all its dimensions.

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