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University teacher roles and competencies in online learning environments: a theoretical analysis of teaching and learning practices

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University teacher roles and competencies in online learning environments: a theoretical analysis of teaching and learning practices

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The aim of this article is to clarify the university teacher roles and competencies in online learning environments, with a view to assisting in the design of professional development activities. This referential framework results from an extensive review of the literature and from analysing professional development designed in different European universities. It is worth mentioning that the definitions that will be produced do not refer to standards of teacher performance; on the contrary, we would like to emphasise the notion of socially situated competencies which are derived from the roles and tasks attributed to university teachers in online learning environments, without losing track of the dialectics and integrity of their exercise.

Keywords: higher education; ICT; online learning environment; teacher competencies; teacher role

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Introduction

Explaining the roles of university teachers poses a challenge. Demands for the renewal of teacher performance in relation to the incorporation of Information and Communications Technology (ICT) into teaching are not made directly but are rather expressed implicitly within curricular reforms; the change is expressed as a need to acquire new competencies, which the teacher often perceives as an added complication to their workload and functions. Added to all this is the diverse range of definitions of the competencies required, a situation that may explain why training actions tend to focus on the development of precise competencies – for example, the command of tools or resources – within educational contexts, which do not take into account university teachers' needs.

In view of the need to reach a consensus on which are to be the proposals for training university teachers to cope effectively with the changes involved in teaching and learning, the aim of this paper is to focus on establishing roles and competencies which differentiate higher education (HE) teaching in online learning environments.

Approaches to the definition of competencies and roles of university teachers in online learning environments

The concept of 'competency' is used in differing ways. In this study we attempt to identify the commonalities and consensus in the relevant literature so as to enable us

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to refer to teacher competencies taking into account, above all, the educational implications associated with them.

It is therefore worth reviewing current definitions and interpretations of the concept of professional competencies, attempting to clarify the differences between the approach of competency as personal skill or ability, linked to behavioural efficiency, and the opposite approach, namely the perception of competency as strategic behaviour, linked to the ability of adjusting performance to the demands from the context.

Competency as skill (*individually placed*) refers to abilities to perform roles and carry out tasks according to standard expectations (McClelland 1973; Pearson 1984; Spencer and Spencer 1993, cited in Eraut 1998). The limitation of this approach lies in the fact that in his or her everyday practice, a professional faces contextual and interactive situations with other professional or 'clients', which call for adequate responses to their specificities and which are probably removed from the standards or the expertise of the 'know how' underlying this point of view.

A second view introduces arguments in favour of *socially situated competency*. In contrast with the previous notion, this approach takes into account the social nature of competency; it is the actors themselves, their expectations, who determine and shape the content of the competencies required to perform successfully in individual professional contexts (Messick 1984; Gonzi et al. 1993, cited in Eraut 1998; Westera 2001).

With regards to training, the first point of view regards competency as a cognitive structure which facilitates specific behaviours, and training as their development. By considering that competency involves a wide range of abilities and entails behaviours with different responses in complex and specific situations, the second assertion subscribes to active and meaningful learning; for example, learning by doing, project-based learning or problem-based learning. This latter point of view seems to us most suitable for understanding the nature of teaching in online learning environments, as well as for the design of teacher training actions.

On the other hand, if the goal of teacher training is to develop competencies, we believe that training must make reference to a minimum set of specific competencies which are related to the variety of roles and tasks to be performed in practice. This conclusion on how to understand training on competencies leads us to look deeper into the definition of roles to which teacher competencies relate, which will ensure not only a better understanding of teaching in virtual environments but, more specially, the design of professional development activities.

In general terms, all of the literature reviewed asserts that university teacher roles in virtual environments are derived from traditional teacher functions. However, it is necessary to clarify teacher roles whilst at the same time specifying which competencies call for these roles within the particularities of the tasks university teachers must carry out in online learning environments. The rationale behind the theoretical reconstruction or elucidation produced in this paper is shown in the Figure 1.

At the basis of this conceptual approach lies the notion that teaching and learning in virtual environments imply making changes to the organisation of teaching and, subsequently, a change in the teacher functions. More than transferring knowledge, a teacher must act as promoter and coach in their students' learning process (Chikering and Ehrmann 1996; Andersson and Fathi 2004; Guri-Rosenblit 2005). In this respect, renewing the teacher function required for the educative use of ICT will call for specific competencies, which to a great extent will depend on the tasks taken on by

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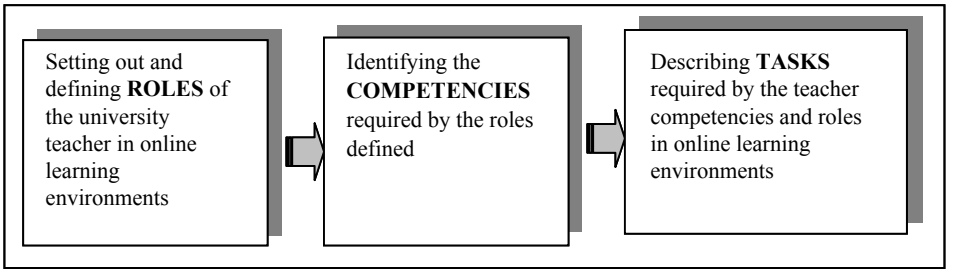

Figure 1. Theoretical structure to define university teacher roles and competencies in online leaning environments.

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the university teacher, as well as on the specificities of the technological teaching environment in which they must display their competencies. Consequently, any attempt at defining or clarifying the university teacher competencies in the use of ICT must start by identifying the specific tasks performed by the teacher in relation to the function or functions being performed in the practice (Klein et al. 2004; Beetham and Sharpe 2007).This statement is a concern shared by trainers and researchers alike. Some attempts to obtain satisfactory answers have led to research being carried out in the last few years. In view of the range and diversity of the bibliographic sources devoted to this topic, we have focused on two objectives:

- clarifying the roles of university teachers in online learning environments
- reviewing how teacher competencies in online learning environments are defined, taking into account the literature and professional development activities.

Methodology

Searching for an operational definition that would enable us to construct a conceptual framework for the design of professional development activities, we deemed relevant to put forward this preliminary study of a theoretical nature reviewing bibliographical references, centring on the definition of teacher roles and competencies in online learning environments.

The starting point for the bibliographic review was a check on the databases from ERIC, ICYT (Science and Technology) and ISOC (Social Sciences and Humanities). These sources contain mainly articles from scientific journals, and they also store a selection of minutes from congresses, series, compilations, reports and monographs. Special attention was paid to looking into specialist journals of great scientific prestige (e.g., *Educational Technology*; *Research and Development*; *Journal of Educational Computing Research*; *European Journal of Teacher Education*; *Open Learning Quarterly Review of Distance Education*; *The American Journal of Distance Education*; *British Journal of Educational Technology*). The scientific output from the past 10 years was of particular interest, given that this is the period during which ICT started to be introduced into teaching. Of course, the 'authoring' criteria also informed our search, as we were guided by the prestige of certain authors who are widely quoted due to their contributions to the scientific research on the

subject matter (e.g., Z. Berge, T. Anderson, R. Hilltz, W. Westera, P. Williams, Ch. Gunamardena, D. Laurillard, G. Salmon). Lastly, we took an interest in the work currently being produced by the International Board of Standards for Training, Performance and Instruction (IBSTPI) and the Association for Educational Communications and Technology (AECT).

We then compared this pool of information with the analysis of recent professional development activities taking place in the university context close to the researchers taking part in the European Project Elene-TT, with the intention of contrasting the theoretical consensus on teacher functions and competencies in a virtual environment with current training trends. We reviewed 16 designs of university teacher training tasks, following deliberate criteria in their selection which enabled us to obtain information on various training trends from European universities (partners of the project). From each university we received two to three teacher training designs which were described following a protocol which ensured homogeneity in the information to process.

Of the 16 professional development activities (training experiences), seven were planned as initial training and nine as continuous training. Half were carried out in online learning environments and the other half as part of blended learning.

In the analysis of professional development activities, we took into account the objectives set – that is to say, the functions and competencies towards which the action aimed (see Table 1). The competencies were categorised following Williams' proposal (2003). Categorising the functions to bring them in line with their respective competencies also respected Williams' classification (technological, managerial, instructive and communicative), noting that this classification is not essentially different from the rest of the authors reviewed, as they all agree on grouping teacher competencies around the four work areas proposed by Williams.

Apart from teacher training tasks, we also examined the expectations and experiences from a sample of 101 university teachers, by means of focus groups. We attempted to obtain consensus on the focus of the debate among the different groups; accordingly, all universities responded to the issues highlighted in the guide to the development of the focus groups.

The central question for the discussion between HE teachers who participated in the group was the following:

- what do teachers need in order to improve the educational uses of ICT in their teaching practice?

The moderators were able to introduce other questions or topics that they considered could help learners to describe their needs. In particular, there were discussions about the pedagogical skills/competences that the university teachers consider they need to develop or improve (i.e., skills to plan teaching; skills to encourage learners or to motivate them; skills to explain contents; skills to organise the work groups; skills to enhance the interaction between students; skills to assess the teaching–learning process); about technological skills/competencies that they need to develop or improve (i.e., skills to use resources and tools; skills to design learning materials (multimedia materials, web-based materials, guidelines, etc)); about kinds of training (recommendations for training); and motivational factors and themes for future training.

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Table 1. Description of professional development activities.

Teacher training practices (title)	Aims
1. MATHONLINE B	To use e-learning tools to improve the level of preparation in mathematical disciplines of students in their last year of secondary school who intend to pursue university studies, and training teachers in the use of new teaching tools
2. IOL (INFORMATICS ONLINE)	To manage online contents and interaction both openly and privately
3. HSH (HOSPITAL-SCHOOL-HOME)	HSH is a project that values the ICT role to guarantee, at best, straight (continuous/uninterrupted) study for pupils in hospital, in out-patient care or receiving home therapy
4. BASICS IN WEB-BASED TEACHING	To design web-based teaching in pedagogically meaningful way To be able to apply what teachers have learned in their own teaching development project
5. FOUR SOFTWARE TO RESEARCH LEARNING	To give participants an overview of what kind of software they may use in analysing different research data and which software is the most relevant to use with certain kind of data
6. HOW TO TEACH ON WEB?	To offer the teachers a personal experience in web-based teaching and teaching methods; in, training several ways of working on the web are tried and evaluated regarding how they fit to one's own work as a university teacher
7. ON-LINE COURSE 'INSTRUCTIONAL DESIGNING FOR ONLINE TEACHING'	To enable teachers to create an online course with the assistance of a developer
8. TUTORING ONLINE COURSES	To enable teachers to follow a group of distance learners
9. THE NURSING PROGRAMME	To make teacher-to-student as well as student-to-student computer conferencing and studying from home possible
10. ICT IN TEACHING AND LEARNING	To produce knowledge and skills of how ICT can, starting from the teacher's own situation, be used to improve the quality of the teachers' accomplishments
11. THE PHARMACEUTICAL SCIENCE PROGRAMME	To raise the teachers' general competence in ICT and to give the teachers involved knowledge of possibilities and limitations when it comes to carrying out net-based education
12. INITIAL TRAINING TEACHER TO UOC'S COUNSELLORS	To provide dynamic virtual counselling to teachers who are experienced in the use of a virtual learning environment
13. INITIAL TRAINING TEACHER FOR MULTIMEDIA & COMMUNICATION STUDIES	To train on the acquisition of the strategies and skills to carry out consulting in an online learning environment

(*Continued*).

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Table 1. (*Continued*).

Teacher training practices (title)	Aims
14. PROFESSIONAL CONSULT	To prevent junior teachers using the professional consult; junior teacher are encouraged to use special training programmes and educational support available in order to become certified for the BKO (Basic Qualification in Education)
15. A WORKSHOP CSCL	To experience how to use collaboration in education effectively and making effective use of ICT support
16. ICT IN OWN EDUCATION	To provide participants with ideas on how to use ICT in their own education To apply innovative pedagogical principles in designing the teaching and learning process with ICT

The opinions put forward by the university teachers were summarised in a report by the moderators of each group, and the analysis of the content of these discussions was categorised around previous teaching experiences, needs and expectations. The codification of the content, both in terms of the training actions and focus groups, was agreed upon by the three researchers of this paper.

Findings

Following the same order as the questions which served as a guide to this study, we will now present the results obtained.

Roles of university teachers in online learning environments

We begin our review of the roles of university teachers carrying out their teaching in online environments by analysing the literature on this subject.

Even sharing the notion that teacher functions in virtual environments are in principle an extension and/or a transfer of the roles required to teach in a face-to-face context, it seems obvious that a change in the nature of the environment calls for new competencies. Online teaching and learning requirements are not limited only to a set of knowledge and experience; the challenges a teacher faces are linked closely to the particularities of interacting and communicating online.

One of the pioneering studies dealing with this topic is that conducted by Berge (1995), whose main assertion is to highlight as a priority the demands made on communicative competencies. This author refers to the online teacher function as that of an instructor/facilitator, and categorises teacher roles into four areas (pedagogical, social, managerial and technical). For each area he offers recommendations that may assist the university teacher during the teaching–learning process, paying special attention to the particularities of ICT.

The definition of teacher roles, specifically for online learning environments, is more recent: it results from observing and analysing current teacher experiences.

Among the most recent literature reviewed for this study, standing out from the rest for their methodological rigour are the studies by Williams (2003), Coppola, Hiltz and Rotter (2002) and Klein et al. (2004). In view of the aims of our study, we will now proceed to comment on what we believe are the most relevant contributions made by these papers to the subject in hand.

Williams defines four major dimensions for categorising teacher roles in environments introducing ICT: (1) communication and interaction; (2) instruction and learning; (3) management and administration; and (4) use of technology (transversal to all). These roles are defined by the competencies they require in practice, which in this study are identified and classified by utilising the Delphi technique.

Coppola et al. (2002) focus their attention on the changes perceived by university teachers as required for teaching in virtual environments. The most significant aspect of this research is the importance it places on the teachers' views on their functions; it shows that university teachers view the change as a transition from 'subject expert' to 'performance coach' in a learning situation. The changes are linked to the styles of interaction with students and with other university teachers, changes in the instructional design, particularly in organisation, management, and control/assessment of the teaching–learning situation. Taking these statements into account, three specific

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university teacher roles are described for virtual environments: the cognitive role, the affective role and the managerial role.

Although not dealing exclusively with online teaching, it is also worth mentioning the study published by ibstpi (Klein et al. 2004). The list of competencies devised by ibstpi includes 18 clusters referring to five domains of teacher performance, which can be linked to their functions: professional foundations; planning and preparation; instructional methods and strategies; assessment and evaluation; and management. Besides detailing the competencies corresponding to each domain of performance, this study also describes 98 performance statements which allow for adequate representation of the competencies, in terms of both assessment and training. This study was validated globally with a sample of more than 1300 practitioners in all world regions.

In addition to the three papers mentioned above, other research pieces reviewed in this study, despite not aiming at clarifying teacher functions and competencies, do bring to the fore and argue that a teacher in an online environment should aim at encouraging creative thinking or the strategic and meaningful building of knowledge, thus giving great importance to the communicative function (Salmon 2000; Prestera and Moller 2001; Gunawardena et al. 1997; Laurillard 2002).

From the analysis of the various studies cited above, we are able to ascertain that in summary the teacher roles that are unique to teaching in virtual environments tend to follow three directions: (1) planning and design role; (2) social role; and (3) instructive role. It is important to point out that exercising one role does not exclude the others; rather, they all integrate or overlap during the teaching–learning process.

The planning and design role refers to those tasks carried out in the planning, follow-up and organisation of the teaching–learning process, as well as anticipating enough actions to promote communication with the students and among the students themselves, in line with the learning goals and content of the course. The social role includes university teachers' competencies required to positively intervene in the learning process, promoting a communicative atmosphere which encourages dialogue and cooperative building of knowledge. The strictly instructive role refers to university teachers' cognitive command (expertise in their subject matter), to their competencies in handling information and promoting deep, complex and critical learning. This role relates to the abilities to introduce content and facilitate learning by means of ICT, issues that are very complex in collaborative learning environments.

Each of the above roles is defined by the more or less precise set of competencies required to perform these roles, an issue on which we can find no consensus. This lack of agreement can be explained by the fact that diverse roles are shaped in correspondence to the tasks performed by the teacher, paying attention to the particularities of each context, both organisationally and socially. However, it is worth highlighting that the studies reviewed coincide in pointing out that the set of competencies required for the technical and managerial command of the teaching process in virtual environments is linked to all functions and roles.

It is also necessary to emphasise the important role played by the teacher social function beyond the traditional instructional function. The social function is usually linked to several roles, with certain terms being used very frequently, such as facilitator, coach, mediator, moderator and tutor, from whom we are to expect a degree of 'accompaniment' and mediation in the students' learning process, especially in collaborative contexts. In most of the literature reviewed, the teacher social function is also

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usually associated to performances which facilitate the learning process, specifically the role of coach or mediator. This is how we interpret the references to roles such as coach, mentor, advisor, tutor, consultant, counsellor supervisor, evaluator, researcher and administrator/supplier of resources (Prestera and Moller 2001; Goodyear et al. 2001; Aydin 2005; Mishra 2005).

Teacher competencies in online learning environments

On the basis of the assertions made above in relation to teacher roles, we continued reviewing the selected bibliography, searching for answers to this second topic. As stated previously, we reviewed studies from some authors who bring to the fore a reflection on teacher performance in online learning environments over the past few years (2000–2006) and on teacher competencies in HE with the aid of ICT.

Williams (2003) identifies 30 teacher competencies in relation to each of the roles they may perform: this author highlights the importance of interpersonal communication and interaction between the teacher and students.

Goodyear et al. (2000) identify and describe the main roles of online teachers. In this respect, they assert that depending on the situation, roles will take a different significance; however, similarly to the studies quoted above, Goodyear et al. also highlight the importance of communication and interaction in online teaching, and deliberately add a set of 23 competencies, alluding to the corresponding tasks associated to the role of facilitator.

On the other hand, Marshal and Akdere (2005) carry out a comparative study contrasting their results to the findings by Thach and Murphy (1994) and Williams (2003). Their conclusions confirm the importance attributed to the generic competencies proposed by these authors, reducing the list to 21, but equally linked to the four functions outlined in Williams' paper. Differently from the results of previous research, this paper takes into account students' views on the teacher in the virtual environment and confirms that students give more weight to their teacher competencies in terms of command of ICT than those competencies related to the communicative and instructive functions.

In addition to these references, other research studies were consulted which, although their objective may not have been to clarify teacher roles and competencies, do emphasise and argue that the teacher in online environments should basically stimulate reflective thought or strategic and meaningful construction of knowledge, thereby giving important weight to the communicative function (Salmon 2000; Gunawardena et al. 2001; Prestera and Moller 2001; Laurillard 2002).

The comprehensive study of the content selected for this analysis enables us to reach two partial conclusions. Firstly, we find a common interest in defining the set of competencies associated to each of the roles identified. Secondly, whilst we have found agreement in the identification of teacher roles, the list of competencies and the priority or rank assigned to each does vary significantly from study to study.

Despite the differences between these conceptual approaches, it is interesting to note that they agree on defending the concept of socially situated competency. That is to say, we do not find any intent behind them to construct or validate any complete or definitive characterisations of the university teacher roles and competencies required to teach in virtual environments. In line with this approach of socially situated

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competency, the papers are based on qualitative research procedures and offer contextualised conclusions.

Analysis of university teacher training practices in online learning environments

The analysis was made focusing on assessing the aims set by the university teacher training activities (review of design of professional development activities) and the expectations and experiences of the university teachers consulted (discussion groups).

A brief summary of the results of this analysis show that in teacher training there are actions geared towards renewing the teaching function for learning with ICT which take place within the four areas into which online teacher functions and roles come together, as referred to in the literature reviewed.

Despite a consensus on the need to promote and give prominence to the teacher social function above all other functions, teacher training goals currently relegate it, favouring instead the development of competencies for planning and design (30%), the latter referring to tasks for the instructional and learning domain (25%), for the technological domain (23%) and for communication or social function (22%). It is also interesting to note that in most cases, training is geared towards introducing technical resources into teaching, without paying sufficient attention to the interdependence between technology and the corresponding pedagogical model.

On the other hand, it is worth pointing out that in our analysis of previous studies we found a correlation between the goals of the professional development activities in hand and the teachers' expectations; the needs expressed in relation to training refer mostly to command of technology.

However, contradictorily, the university teachers taking part in the focus groups mentioned that some of the main obstacles impeding success in teaching/learning in virtual environments are essentially related to the exercise of the social and instructive functions in virtual environments (promoting meaningful learning among students, incorporating ICT into the learning process, assigning them pedagogical uses and meeting the expectations of online students – keeping the message boards up-to-date), for example:

> I could use more perspective on how I can use ICT as natural part of my teaching and how to develop use of ICT more pedagogically meaningful. In that case I think ICT would guide students and work in favour of students' meaningful learning. (Teacher at the Faculty of Biosciences, University of Helsinki, Finland)

Answering their questions systematically, structuring and monitoring collaborative work groups are all recommended steps:

> The learners realise that it is important and effective to have a mentor. A mentor is in this case said to be a person to go beside and learn from in the teaching situation. A training situation where you can discuss your experiences with your colleagues is also mentioned as very important.

> Furthermore, ongoing support from colleagues is known to be one of the most important ways to learn distance pedagogy and methodology. It has been shown that that the co-operation between the tutors and the teachers is good. If the co-operation works well the university teachers see it as a promotion factor. It is thus important that the teacher is informed about the division of responsibility between the local tutor and the teachers.

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(University teachers at the Pharmaceutical Science Program and the Nursing Program at Umeå University, Sweden)

This contrast between training goals and the problems as perceived by university teachers in practice reveals confusion and/or contradictions which are probably best explained by the lack of clarity surrounding online functions and competencies. Having reached this point of agreement and clarification, and in line with our initial statement calling for the definition of socially situated competencies, it is then necessary to elaborate on the tasks assigned to university teachers in online learning environments, in relation to each one of the functions and competencies defined. This clarification is crucial in the design of teacher training actions and may take place before the design by means of the assessment of formative needs and the nature of the educational/technical contexts in which the university teachers perform their functions, whilst at the same time making it easy to define those competencies related to the various functions that are identified.

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Conclusions

First and foremost, a study carried out with the objective of clarifying the roles and competencies of university teachers in online learning environments necessarily links with the notion of situated learning (Barad and Duffy 2000). This point of view means that any statements on the competencies required to teach in online learning environments must always be made in relation to context and, consequently, any such statements will be relative to these particular circumstances. This is why, in order to organise the information collected for this research paper, we have chosen to group the competencies identified around five main roles which, in our opinion, are clearly differentiated in accordance to the nature of the tasks with which they are associated.

On the other hand, it seems that in practice, teacher tasks in online learning environments are carried out by different professionals, so that a university teacher does not necessarily perform all the roles but rather interacts with other teachers and professionals in general. In any case, the competencies required by the university teacher in practice will depend not only on the role being performed but also on the nature and complexity of the task being carried out. Consequently, this notion implies that there is an overlap of university teacher competencies in online learning environments.

Furthermore, without ignoring this principle, most of the research pieces reviewed for our study tends to group university teacher competencies in online learning environments according to the different roles or domains which were identified. In our opinion, besides reaching an agreement with regards to the definition of roles and domains required by the university teacher in online environments, we also need to specify clearly the type of task they are carrying out within their diverse roles, as well as the specificities of the teaching environment in which they are performing their work.

In general terms, from all these studies we can infer that there is an effort to respond to the need of clarifying and/or agreeing upon the roles and competencies required by teaching in long-distance learning which incorporates the use of ICT and, above all, to obtain a rational connection between the roles and competencies identified. Without wanting to generalise, and taking into account the uncertainties that this

study has highlighted, below we outline the roles that could be identified with regards to the tasks carried out by university teachers in online environments.

Designer/planning role

This role includes instructor behaviour related to course planning, organising, leading and controlling. Tasks include: defining the procedures of instructional design; considering the resources and the assessment in a virtual context; presenting content/questions; translation of traditional content in online contents with interactive activities for students; creation of online interactive content; written and oral presentation of an instructionally designed sequence with tutoring environment; and establishing time parameters.

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Social role

This role includes instructor behaviour related to influencing students' relationships with the instructor and with other students. Tasks include: managing cooperative interactions among students; managing the online interaction with distance learners through its synchronous activities (live lessons, homework and virtual labs, exchange of didactical methodologies between other instructors, interaction on web); communication in the virtual room (visible and non-visible processes); identifying areas of agreement/disagreement; diagnosing misconceptions; seeking consensus/understanding, encouraging, acknowledging or reinforcing student contributions; setting climate for learning; drawing in participants; prompting discussion; assessing the efficacy of the process; confirming understanding through assessment and explanatory feedback.

Cognitive role

The cognitive aspect of instruction deals with mental processes pertaining to perception, learning, information storage, memory, thinking and problem-solving. This relates to mental processes of learning, information storage and thinking, and shifts to one of deeper cognitive complexity. Tasks include: learning guidance and evaluation and factors that influence interaction on the web; tutoring in a distance learning environment over the internet; validation of knowledge acquired by web-assisted learning; providing in-practice strategies about how to drive a virtual classroom (communication with the students, the virtual classroom); to know aspects of collaborative, active, constructive, reflective and authentic learning; didactic organisation (effectiveness of live synchronous interactions in virtual classrooms, homework and virtual labs); and evaluation of web-based teaching.

Furthermore, in our opinion, teaching in online environments demands transversal competencies from the teacher, profiles or domains which are the common denominator in the other university teachers' roles.

Technological domain

This relates to knowledge of support services, multimedia knowledge, basic technology knowledge, technological access knowledge and software skills, and data analysis

skills. Tasks include: functionalities in the virtual campus; styles of virtual communication; virtual environment uses of applications for web-based teaching; online platform tools usable for tutoring; applications and resources (i.e. learning management systems (LMS)); and establishing working with ICT in campus and flexible courses.

Managerial domain

Management is connected to a group of competencies that allow the teacher to develop and adapt the planned actions and, in the same way as the technological competencies, also integrate transversally into any of the teacher's roles, such as: responding to expectations, motivation and learning needs; administering the online classroom; managing spaces and channels of communication – in other words, supervising and tailoring the process in progress and online. Tasks include: driving a virtual classroom and the shared file area; managing a virtual environment of learning (synchronous and asynchronous places); managing the shared mailboxes; monitoring in the class praxis the delivery of the complementary content in an online format and injecting knowledge from diverse sources (e.g., textbook, articles, Internet, personal experiences).

These conclusions are particularly relevant in relation to the design of teacher training actions to develop these functions. In terms of methodology, consulting experts using the Delphi method is recommended in order to reach the most valid conclusions regarding which competencies university teachers need in order to suitably develop the tasks required in their particular teaching and learning environments.

Implications for teacher training practices

The introduction of ICT into teaching brings about substantial changes to the learning process, but probably the most important change involved is the change to the teaching function. In this renewal, an important role is played by the teacher social function – guiding learning, communicating online – without ignoring the high demands for planning required by online learning environments. From this perspective, training methods for the use of ICT in teaching must be renewed and adapted to the current and real needs of university teachers and university education.

The results of this research provide teacher trainers with a conceptual approach as point of reference which alludes to teacher functions and competencies in virtual learning environments. Special emphasis is given to the need to assimilate the concept of socially situated competency – that is, to pay attention to the nature of the tasks and the particularities of the virtual learning environments where teaching takes place. This point of view is especially useful for making the best possible use of ICT in HE and encouraging university teachers to fully integrate the innovative teaching and learning practices, and above all it seems crucial to take it into account with regards to professional development actions:

> The people who had actually changed their practice reported that a crucial turning point was often the opportunity to witness the real thing, in the real context, with the real people; in other words, to actually watch a new approach or tool action. (Sharpe and Oliver 2007, 118)

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Lastly, and as a close to these theoretical principles, it is important to highlight that in practice teacher functions and competences integrate and complement each other, sometimes even overlapping, even though we can distinguish the competencies required for each function, as well as the need to outline the tasks required by them. This fact therefore calls for the creation of training actions which allow for the authentic and integral exercise of teacher functions in virtual learning environments.

In our opinion, this conceptual clarification may assist in designing training actions which are closely linked to the nature of teaching in virtual environments, designs based on authentic learning (learning based on tasks, problem-based learning and project-based learning), so that the training itself enables the re-conceptualisation and renewal of teaching practices. This proposal may become an antidote to resistance to change, whilst at the same time enabling us to adjust training to university teachers' needs and capabilities; that is, why there is a need going forward to keep this research focused on defining the methodological criteria that may assist trainers in the effective design of training actions required by university teachers if they are to respond effectively to the challenge of teaching to learn in virtual environments.

The conceptual framework arising from this research – definition of roles and competencies for university teachers in online learning environments – attempts to make a contribution to better planning of their training, so that these conclusions turn out to be useful in terms of helping to clarify the methodological criteria which to a great extent guarantee the efficiency of training in two senses: meeting teacher training needs and, consequently, improving teacher practices in university virtual environments.

In this sense it is worth comparing, defining and enhancing the findings of this preliminary study by means of an approach to the experiences and opinions of professionals in the field. From our point of view, a piece of research aimed at looking into the shared meanings with regards to the roles, competencies and tasks required by university teachers to teach and learn in virtual environments, may be much more useful, at least in the scope of action involved in this paper.

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