Exploring the use of information and communication technologies and social networks among university nursing faculty staff. An opinion survey

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Exploring the use of information and communication technologies and social networks among university nursing faculty staff. An opinion survey

Objective. This work sought to analyze the use of Information and Communication Technologies (ICTs) and social networks among the university nursing faculty staff in Spain. **Methodology.** This was a descriptive, cross-sectional study using a questionnaire on ICT skills designed to comply with the research objective, which was evaluated by experts and which was subjected to exploratory analysis of principal components; the reliability of this instrument measured with Cronbach's alpha was 0.85. The information technology tool used to publish the questionnaire on line was Limesurvey. The sample comprised 165 professors from 25 Nursing Faculties and Schools from universities in Spain. **Results.** Seventy one percent of the total surveyed used internet services to look for information, 63% used the internet as a means for formation and learning, and 72% used it as a communication platform (e-mail and virtual platforms like Sakai and Moodle). Although 51% of the teaching staff surveyed had more than 120 students registered in their courses, hypothesis testing revealed that the number of students in class is not a determining factor for the teaching staff to have greater interest to update its knowledge in ICTs. Younger professors use new technologies more profusely and the most-valued advantage of using ICTs was quick access to information. Professors perceive that after the Bologna Declaration, which requires modifying their teaching-learning processes through the new teaching methodologies, a drop has been produced in their performance and that of their peers in their area of knowledge. **Conclusion.** The nursing teaching staff is making strong efforts to confront the new challenges posed by ICTs to train the professionals of the 21st century. It is fundamental to

pay special attention to improving the university teaching staff's skills in managing ICTs, promoting the implementation of the knowledge acquired.

Key words: education, nursing; educational technology; nursing research.

Explorando el uso de las Tecnologías de la información y la comunicación y las redes sociales entre el profesorado universitario de enfermería. Una encuesta de opinión

Objetivo. Analizar el uso de las Tecnologías de la información y la comunicación –TIC- y las redes sociales entre el profesorado universitario de enfermería en España. **Metodología**. Estudio descriptivo de corte transversal en el que se empleó un cuestionario sobre competencias TIC diseñado para cumplir con el objetivo de investigación, el cual fue evaluado por expertos. Posteriormente, se le hizo análisis exploratorio de componentes principales. La confiabilidad de este instrumento fue 0.85, medida con el alfa de Cronbach. La herramienta informática utilizada para publicar en línea el cuestionario fue Limesurvey. La muestra estuvo compuesta por 165 profesores de 25 Facultades y Escuelas de Enfermería de las Universidades de España. **Resultados**. El 71% del total de encuestados utilizaba los servicios de Internet para buscar información, el 63% hacía uso de Internet como vía de formación y aprendizaje y un 72% lo empleaba como plataforma de comunicación (correo electrónico y plataformas virtuales como Sakai y Moodle). A pesar de que el 51% del profesorado encuestado tenía más de 120 alumnos matriculados en sus cursos, un contraste de hipótesis reveló que el número de alumnos en clase no es un factor determinante para que el profesorado tenga mayor interés por actualizar sus conocimientos en TIC. Los profesores más jóvenes utilizan con mayor profusión las nuevas tecnologías y la ventaja más valorada del uso de las TIC fue el acceso rápido a la información. Los profesores perciben que tras la Declaración de Bolonia, que exige modificar sus procesos de enseñanza-aprendizaje mediante las nuevas metodologías docentes, se ha producido un descenso en el rendimiento propio y en el de sus compañeros de área de conocimiento. **Conclusión**. El profesorado de enfermería está afrontando con esfuerzo los nuevos retos que las TIC plantean para formar a los profesionales del siglo XXI. Es fundamental prestar especial atención al mejoramiento de las competencias en manejo de TIC del profesorado universitario, impulsando la puesta en práctica de los conocimientos adquiridos.

Palabras clave: educación en enfermería; tecnología educacional; investigación en enfermería.

Explorando o uso das Tecnologias da informação e a comunicação e as redes sociais entre o professorado universitário de enfermagem. Uma enquete de opinião

Objetivo. Analisar o uso das Tecnologias da informação e a comunicação –TICs- e as redes sociais entre o professorado universitário de enfermagem na Espanha. **Metodologia**. Estudo descritivo de corte transversal no que se empregou um questionário sobre concorrências TICs desenhado para cumprir com o objetivo de investigação, o qual foi avaliado por experientes e ao que posteriormente se lhe fez análise exploratório de componentes principais; a confiabilidade deste instrumento medida com o alfa de Cronbach foi 0.85. A ferramenta informática utilizada para publicar na linha o questionário foi Limesurvey. A amostra esteve composta por 165 professores de 25 Faculdades e Escolas de Enfermagem das Universidades da Espanha. **Resultados**. 71% do total de interrogados utilizava os serviços de Internet para procurar informação, 63% fazia uso de internet como via de formação e aprendizagem e um 72% o empregava como plataforma de comunicação (correio eletrônico e plataformas virtuais como Sakai e Moodle). Apesar de que 51% do professorado interrogado tinha mais de 120 alunos matriculados em seus cursos, um contraste de hipótese revelou que o número de alunos em classe não é um fator determinante para que o professorado tenha maior interesse por atualizar seus conhecimentos em TICs. Os professores mais jovens utilizam com maior profusão as novas tecnologias e a vantagem mais valorizada do uso das TICs foi o acesso rápido à informação. Os professores percebem que depois da Declaração de Bologna, que exige modificar seus processos de ensino-aprendizagem mediante as novas metodologias docentes, produziu-se um descenso no rendimento próprio e no de seus colegas da área de conhecimento. **Conclusão**. O professorado de enfermagem está enfrentado com esforço os novos reptos que as TICs propõem para formar aos profissionais do século XXI. É fundamental prestar especial atendimento ao melhoramento as concorrências em manejo de TICs do professorado universitário, impulsionando a posta em prática dos conhecimentos adquiridos.

Palavras chave: educação em enfermagem; tecnologia educacional; pesquisa em enfermagem.

Introduction

Information and Communication Technologies (ICTs) are emerging in new study plans of the nursing career in recent years, which is marked by the implementation of the European Space for Higher Education and legal reforms in countries incorporated to the Bologna Process and the Prague Communiqué. The objectives of the Bologna Declaration, signed on 19 June 1999, include harmonizing the European higher education systems and setting the bases for convergence among member states in terms of academic recognition, with a system based on two cycles.[1] It also sought to establish a common European Credit Transfer System and promote European cooperation to ensure a level of quality in developing comparable criteria and methodologies, which would facilitate continuous formation of students throughout their lives. Within this setting, both professors and learners must modify their teaching-learning processes through new teaching methodologies. The ICTs play a very important role in the new educational resources as didactic resources in university careers in general, and of nursing in particular,[2,3] as objects of study, as elements for communication and expression, as instruments for educational organization, management, and administration, and/or as instruments for research.

Information and communication technology skills are understood as the capacity to know and understand, and know how to apply in practice this knowledge of ICT use in their diverse functions and application contexts.[4] Command of ICT is essential for the teaching profession.[5] Teachers must be able to design, develop, and evaluate learning experiences based on new technologies. A clear example of this revolution is the increased use of on-line teaching applications,[6] mobile devices in class,[7] and Massive Online Open Courses (MOOCS) given at the most prestigious universities in the world like Stanford, Harvard, and Berkeley.[8] Use of ICTs is also broadly recognized by other international organisms. The World Health Organization identified its use as a crucial skill to accomplish optimal development of human health resources, improve health systems, and as instruments to reach the Millennium's Development Objectives.[9] This new scenario implies an adaptation effort by nursing teaching staff. Professors are asked for new skills in advanced command of ICTs,[10] as well as systems of continuous network formation that help them keep abreast of knowledge.[11] The new teaching methodologies and technologies will share leading roles with the master class, actively implicating students in their own learning, educating and training future health professionals in skills of critical and reflexive thought reinforced on selflearning.[12] Within this context, the aim proposed in this work was to analyze the perception of university nursing professors on the use of ICTs as didactic resources in achieving the objectives of the Bologna Declaration. For this, information has been gathered by e-mailing a questionnaire to a random sample of professors from Nursing Faculties and Schools of Spanish public and privately run universities.

Methodology

This work sought to study the perception university nursing professors have on the use of ICTs as teaching resources. The specific objectives were: (1) identify what technologies are employed and for what purpose; (2) learn what formation the university nursing professors have acquired on ICTs; (3) inquire on what types of cooperation networks the professional professors create to share their knowledge to improve the quality of teaching and research. Two methods were employed to develop the objectives proposed in this research: literature review and empirical study. Hence, the research was conducted in two phases:

1- Search and analysis of bibliographic background, as well as national and

international questionnaires used to measure opinions on the use of ICTs by university nursing faculty staff. A review was made from 2003 to August 2012. Other relevant documents were also identified from the authors' expert knowledge.

2- Design, validation, and application of an evaluation instrument based on a questionnaire available for university nursing faculty staff. On-line activation was conducted of the questionnaire to evaluate ICT skills of Spanish university nursing professors.

Sample. An exhaustive list was created through the web page of the Spanish Ministry of Education, from which were selected public and privately run Nursing Faculties. Additionally, the different secretaries from the Centers were contacted as an initial entry point and link prior to contacting the teaching staff. With this intention, they were sent a presentation letter explaining the motivation of the research. The inclusion criteria in selecting the sample was the active full or part-time teaching staff, including clinical and academic associate teaching staff, without excluding those who were currently on sick leave, vacation, or sabbatical year. The study population was composed by 434 university professors who carry out their professional work in Nursing Faculties of Spanish higher education institutions. An e-mail was sent to all the professors selected, explaining the objective of the research and inviting them to participate. After six weeks in which the questionnaire remained available on the web (from 01 March to 15 April 2013), a total of 165 (38.01%) questionnaires were completed.

Literature review. Several similar relevant publications exist for this work. A study using a 34-question questionnaire showed that university professors from Universidad de Las Palmas in Gran Canaria maintained a positive attitude regarding the use of ICTs in their daily practice.[13] A total of 30 university professors also responded positively to a questionnaire on their perception to on-line learning in a university center in Taiwan.[14] In a Dutch university, 178 university professors completed a questionnaire to identify the factors that explain the use of on-line learning environments. The perception of the added value of these environments was obtained as predictor.[15] In another study conducted in the University of South Carolina, a total of 197 participants responded to a questionnaire on the perception of the needs professors have to use ICTs.[16] It was concluded that greater technical assistance would be required to maximize the adoption of the new technologies employed in class and on line (principally in-class response devices and electronic boards). Also, great formation demand was found in databases and software to design web pages and capture images and audio. More specifically in the health field, numerous studies exist based on questionnaires that investigate different factors on the use of ICTs among university teaching staff. By applying Pierre Bourdieu's practice theory, internal factors were identified (knowledge of information technology, perceived utility), as well as external factors (lack of time, limited infrastructure) that influence on the adoption of ICTs among the university teaching staff from a university in the United Kingdom.[17] The aim of a study through questionnaire conducted in the United Kingdom was to determine the opinion of 102 university instructors with respect to the use of on-line teaching. Although most of the participants recognized the benefits of the new technologies in teaching, scarce resources, time and technical support were the main obstacles found.[18] A study conducted through an on-line questionnaire with 193 university professors from the United States revealed that more than half of those surveyed were frequent users of distance learning and of information technology tools.[19] Approximately 66% of those surveyed indicated they were competent regarding ICTs, although 69% recognized the need for more formation. The availability of technical, financial, and formative support was statistically associated with the use of distance learning technologies. An on-line questionnaire to directors and deans of 266 nursing programs in faculties of the United States also confirmed the idea that the university nursing professors had a basic level of knowledge in nursing informatics.[20] A questionnaire to 171 university

nursing professors recognizes the greater load in terms of time that supposes preparing material for web courses against classroom courses.[21] Another study discovered that the motivation of the academic personnel is the most important factor to participate in distance learning.[22]

Instruments. The members of the research team elaborated a list of factors to evaluate from their personal experiences, complemented with some dimensions gathered from another questionnaire on the use of ICT among university teaching staff.[13] A literature review was carried out in the national and international setting, which analyzed and critically evaluated the questionnaires found.[17-26] The CUIDEN, SciELO, ScienceDirect, and PubMed databases were consulted, as well as other on-line bibliography sources,[27,28] on the use of questionnaires as research technique used in our object of study. After an adaptation, harmonization, and extension process of all the questionnaires so they would be most useful in gathering information, a list of 42 items was obtained. Specifically, during this phase issues related to the virtual platforms used by professors were combined and enhanced. Some questionnaires considered few tools, among them the teaching board, which turns out poor in the data analysis of our study. Other questionnaires introduced questions that resulted too long or included technical aspects that require advanced informatics knowledge, which is why they were omitted. Additionally, issues related with professor categories in most of the questionnaires analyzed did not gather all the figures of the current Spanish university system. The questionnaire was subjected to the Delphi consensus technique among nine experts, which included active-service nurses, university nursing professors, and university informatics professors with experience in innovation teaching projects. As a result of this process, in the analysis of the demographic data, the decision was adopted to consider the area of knowledge and not the name of the assignment taught. Although the name of the assignment is more specific, it is not as determining as the area of knowledge to learn of the professor's formation. Also, adding a third section was proposed: social networks,[29,30] to analyze how different professional professors transfer information and help, creating cooperation networks that impact upon a higher quality of teaching. Currently, confusion exists with the concept of networks, given that "networks" are mainly related to digital connections like Facebook and not to interpersonal links. From here on, we will refer to the term network as structure of connections among physical individuals and not among virtual connections or links.

After this first review, the questionnaire was reduced to 34 items and it was again sent to the experts who after a new Delphi round achieved a 25-item questionnaire. To determine the content validity, the resulting questionnaire was sent to another panel of three experts (different from the previous), comprising nursing and informatics researchers related with teaching in ICT. After receiving suggestions in drafting two questions and some observations, the final 24-item questionnaire was obtained. The questionnaire drawn up has three sections: (1) demographic data; (2) personal opinion issues proposed on the use of ICTs; and (3) analysis of social networks. A five point Likert-type scale was used in which 1 means "Disagree totally" and 5 means "Agree totally". The information technology tool used to publish the questionnaire on line was Limesurvey. For statistical treatment of the data, the SPSS (version 19) statistical package was used.

Instrument validation. Once the first complete version of the questionnaire was designed, a pilot test was carried out in on-line version and self-administered, and the evaluation of the metric properties of the scale.[28] The pilot or pretest was given to 35 individuals similar to those in the sample, but who would not participate in the study, and, thus, avoid possible bias of expectations. Additionally, the participants were invited to evaluate comprehension and length of the questions formulated through informal interviews. It was tested if the statement was correct, with a logical internal order and adequate categorization of responses. Besides, no psychological resistance or rejection to any question was identified, and its duration was acceptable for those surveyed. Subsequently, an

analysis and evaluation of the metric properties of the pretest was carried out to make sure the measurement instrument was reliable and valid. To evaluate the internal consistency, Cronbach's alpha value was calculated for the questionnaire, obtaining a value of 0.85. The item-total correlation values ranged between 0.52 and 0.73. Acceptable temporal stability (test-retest reliability) was obtained between its on-line application and its self-administered application (ICC = 0.81). For the validity of the construct, the exploratory factor analysis through the principal components method with varimax rotation was calculated, with a measure of sampling adequacy KMO = 0.832. Bartlett's test of sphericity showed significant approximation ($p < 0.001$).

Statistical analysis. Descriptive statistics was performed, presenting frequencies and percentages for qualitative variables, as well as standard means and deviations for the quantitative variables. In hypothesis testing, for quantitative dependent variables, Student's t test was applied to compare the means of two groups, and the ANOVA of one factor to compare those of more than two groups. To apply these parametric tests, we tested the normality of a sample distribution through the Kolmogorov-Smirnova test and the equality of variance through the Levene test. For dichotomy qualitative dependent variables we used binary logistic regression, applying Wald's test and calculating the odds ratio. To analyze questionnaire validity, we employed the technique of exploratory factor analysis of principal components, followed by Varimax rotation for construct validity. The adequacy of factorial analysis was evaluated through the Kaiser-Meyer-Olkin (KMO) test and Bartlett's test for sphericity. Cronbach's alpha coefficient was used to evaluate internal consistency and intra-class correlation coefficients (ICC) were used to measure test-retest reliability.

Results

Descriptive statistics. A total of 165 complete questionnaires were received from 25 Nursing Faculties and Schools throughout Spain. Table 1 illustrates the general characteristics of the sample, which can be summarized in that females predominated (63.63%), age was >44 years (50.92%,), area of knowledge is health (77.57%), one in every five is a University School full professor, three in every five have more than six years of seniority in the university, teaching specially in the first three years of the undergraduate program, and one in every two professors had over 120 registered students assigned to them.

Table 2 highlights lap-top computers as the most-used device during an academic course (73.33%). Most professors (60.61%) prolonged their work shift outside the university facilities, using telematic networks to connect with their university's ICT systems. A total of 71.52% used internet services to search for information, 63.64% used the internet for formation and learning, and 72.73% as communication platform (email and virtual platforms like Sakai and Moodle).

Students received training in ICT. When they were asked for their opinion on the level of command they had of ICT, 15.15% reported that it was basic, 43.64% stated that it was a medium level, 15.15% felt it was high, and 1.82% reported not using them. A total of 24.24% of the students did not answer these two questions.

Regarding the search for information related to research and teaching through people outside the university, those surveyed were asked to establish an order on 14 possible advantages and nine possible inconveniences of using ICT by the teaching staff (Table 3), assigning a score from 14 to 1, and from 9 to 1, respectively, in order of election. Quick access to information (M=10.31) and open and flexible formation processes (M=9.73) were the most valued benefits. On the contrary, professors do not perceive that the application of ICT allows them to have more time for other tasks (M=2.58). Among the most notable inconveniences of using ICT, dispersion (M=6) and need for continuous formation (M=5.83) were found.

Table 1. General characteristics of the sample

Variable	n (%)
Gender	
Male	39 (23.63)
Female	105 (63.63)
NK/NR*	21 (12.74)
Age in years	
24-33	19 (11.51)
34-43	38 (23.03)
44-53	50 (30.30)
54-63	33 (20.02)
64+	1 (0.60)
NK/NR	24 (14.54)
Area of knowledge	
Health	128 (77.57)
Others	14 (8.49)
NK/NR	23 (13.94)
Curses taught	
First	55 (33.33)
Second	110 (66.67)
Third	80 (48.48)
Fourth	36 (21.82)
Masters'	34 (20.61)
PhD	9 (5.45)
Teaching category	
Hired full time	30 (18.18)
Hired part time	15 (9.09)
Associate	27 (16.36)
Aide	5 (3.03)
PhD Aide	5 (3.03)
Collaborator	14 (8.48)
University School Full Professor	35 (21.21)
University Full Professor	12 (7.27)
University School Professor	1 (0.60)
NK/NR	21 (12.72)
Seniority in the University	
≤5 years	44 (26.66)
6-15	49 (29.69)
16-25	39 (23.63)
26-35	10 (6.06)
≥36	2 (1.21)
NK/NR	21 (12.72)
Registered students assigned in all the courses	
0-30	4 (2.42)
31-60	7 (4.24)
91-90	27 (16.36)
91-120	22 (13.33)
≥121	84 (50.90)
NK/NR	21 (12.72)

* NK/NR: No knowledge/ No response

Table 2. Characteristics of the personal opinion variables

Questions	Yes n (%)	No n (%)	NK/NR n (%)
Has used any of the following during the 2012-2013 course			
Lap-top computer	121 (73.33)	5 (3.03)	39 (23.64)
Clicker	12 (7.27)	114 (69.09)	39 (23.64)
PDA	12 (7.27)	114 (69.09)	39 (23.64)
Cell pone	54 (32.73)	72 (43.64)	39 (23.64)
Smart pone	24 (14.55)	102 (61.82)	39 (23.64)
e-book	21 (12.73)	105 (63.64)	39 (23.64)
Note-book	10 (6.06)	116 (70.30)	39 (23.64)
Tablet	27 (16.36)	99 (60.00)	39 (23.64)
When outside, uses telematic networks to connect with the university's ICT systems	100 (60.61)	26 (15.76)	39 (23.64)
Purpose of using internet services in the past course			
Look for information	118 (71.52)	8 (4.85)	39 (23.64)
Formation and learning	105 (63.64)	21 (12.73)	39 (23.64)
Communication platform	120 (72.73)	6 (3.64)	39 (23.64)
Others	54 (32.73)	72 (43.64)	39 (23.64)

Table 3. Advantages and disadvantages of searching for information related to research and teaching through people outside the university

Advantages	**Score**
Quick access to information	10.31
Open and flexible formation processes	9.73
Rapid updating of published formation content	9.51
Improves communication/contact between professor and student	9.00
Complementary activities to support learning	8.26
Rupture of spatial/temporal barriers	7.95
Improves educational effectiveness	7.80
Raises student interest, motivation, and initiative	7.42
Promotes individual learning	6.93
More personalized teaching	6.72
Promotes cooperative learning	6.65
Improves communication among students	6.29
Permits controlling student performance in formation processes	5.84
Allows professor to have more time for other tasks	2.58
Disadvantages	
Dispersion	6.02
Need for continuous self-recycling	5.83
Problems of computer maintenance	5.55
Distractions	5.51
Unreliable information	5.45
Incomplete and superficial learning	5.44
Stress in teaching staff	4.14
Loss of time	3.83
Anxiety	3.22

Relationship between demographic variables and opinion variables. By using Pearson's correlation coefficient, we obtained a negative correlation of -0.12 between age and the number of devices (lap-top computer, tablet, etc.) used in the teaching practice. These results indicate that younger professors use more profusely the new technologies. Significant differences were not found between a periodic formation and their perception on their teaching capacity and command of ICT (p=0.679). Significant differences were also not found between the number of students a professor teaches and connecting through telematic networks from outside the work center to the university's ICT systems, or between teaching classes in the first, second, third, fourth, masters', PhD courses, on the degree of implication of the teaching staff in their formation in ICT.

The Chi square test found significant differences among teaching at the masters' (p=0.05), PhD (p=0.28) levels and teaching capacity in the command of ICT. Specifically, professors who teach in the masters' level have 2.56 times more probability of having a high command and capacity to manage ICT. For professors who teach in the PhD level, this value increases to 4.57 times. Instead, no significant differences were obtained among: (1) number of students in class with respect to interest to update their knowledge in ICT, (2) teaching category and receiving formation in ICT, (3) teaching category and teaching capacity to manage ICT.

Social networks. Another multiple choice question was formulated to know who used social networks outside or inside their university. Tables 4 and 5 show the mean scores assigned by those surveyed in relation to the university figures and preferred external contacts to search for information related to research and teaching.

Table 4. Search for information related to research and teaching through work peers and contacts outside the university

Professional category of the internal contact	Mean score (research)	Mean score (teaching)
Hired full time	2.69	2.68
Hired part time	2.00	2.05
Associate	2.14	2.18
Aide	1.75	1.76
PhD aide	2.08	2.13
Collaborator	2.34	2.28
University School Full Professor	2.81	2.86
University Full Professor	2.37	2.36
University School Professor	2.01	1.99
University Professor	1.78	1.73
Contacts outside the university		
Peers from other universities	2.85	2.98
Relatives	1.69	1.64
Friends	2.13	2.01
Scientific associations	3.01	2.44
Syndicates	1.33	1.36
Research centers	2.73	2.23
Professional Schools	1.95	1.77
Central government organizations	2.17	1.86
Autonomous and Local government Organizations	2.17	1.88
Private entities	1.90	1.78
Hospitals and health centers	2.78	2.44

Hypothesis testing was conducted (paired Student's t test) between the professional categories and external contacts with higher and lower mean, both for teaching and for research. Statistically significant results were obtained between University School Full Professors and aides, $t(124) = 4.032$ ($p < 0.001$), and between peers from other universities and syndicates, $t(119) = 12.237$ ($p < 0.001$) for research, and between University School Full Professors and University Professors, $t(121) = 7.475$ ($p < 0.001$), and between peers from other universities and syndicates $t(117) = 13.583$ ($p < 0.001$) for teaching. The last question on the questionnaire and in the social networks section inquired if the Bologna Declaration had impacted upon the professors' performance. The results show that, after the Bologna Declaration, the professors perceived that a drop had been produced in their personal performance (from M=3.94 to M=3.79) and within their area of knowledge (from M=3.88 to M=3.72) with respect to their ICT skills. Hypothesis testing showed that these differences were significant in personal performance $t(116)=2.14$ ($p=0.034$) and in the performance of the peers in the area of knowledge $t(116)=2.01$ ($p=0.046$).

Discussion

The majority of the teaching staff surveyed (88.49%) is over 33 years of age, which can have a negative impact on the predisposition to learning the new technologies.[31] Habitually, activities linked to ICT and teaching have not had well-defined funding, management, and development channels in Spanish universities. On the contrary, these activities have been developed by enthusiastic professors, who have managed to autonomously acquire the necessary resources to implement them.[32] More than half of the teaching staff has been on the job between 6 and 25 years, probably due to the creation of numerous Nursing Schools during the period of expansion of universities in Spain.[33] The percentage of professors with less than five years on the job is also high (26%), justified by the creation of the four-year Nursing degree, which added one more course to the former Diploma course in Nursing and that has required new recruitment. Also noted were a good number of areas of knowledge represented in the sample, reflecting a high degree of multi-disciplinary assignments belonging to nursing careers in Spain.[34]

Given the recent creation of PhD programs in nursing, there is scarce presence of teaching staff of the University Full Professor category, as well as PhD thesis advisors. Employing the TESEO information source,[35] the first nursing thesis in Spain dates to 1983. Since then, and until 2007, there is an average of 12 theses per year. However, since 2008 this average has increased, reaching 18 during the 2012/13 academic course.

There is a high percentage of nursing faculty staff who teaches in the initial courses, where the classrooms tend to be overcrowded. A certain predisposition could be expected of nursing professors to use ICT, given that the results reveal that 80.59% of the university nursing faculty staff surveyed has over 60 students assigned to them. Although numerous studies show the importance of ICTs as educational resource in overcrowded classes,[6] hypothesis testing revealed that the number of students in class is not a determining factor for the university nursing faculty staff in Spain to have greater interest to update their knowledge in ICT. A possible cause may be found in the scant recognition of the merits for teaching innovation in accreditation processes of the teaching staff in Spain, and it is perceived that they will be absolutely marginalized during the following university reform legislation.[36]

Our results confirm prior studies that identify the use and application of the internet as one of the tools par excellence of the university teaching staff. Although most nursing professors use a lap-top computer, undoubtedly, it seems that the use of wireless devices emerges strongly, especially cell phones and tablets, as confirmed by previous studies.[7] Another important bastion in university teaching are the institutional support services for

teaching implementation of ICT. Most Spanish universities have adopted learning management systems like Moodle or Sakai, although until recently, their use had still not extended among the university teaching staff.[26] The data obtained offer evidence that the university nursing faculty staff access digital resources to enhance their teaching work, as well as select and use adequate tools and ICT resources for student learning. In spite of their extraordinary predisposition (66.67% of the university nursing professors received ICT formation), the majority (43.64%) considers having a medium level in managing ICT and only 15.15% recognize having a high level of command of skills related with ICT, in line with other works that confirm the difficulty of their learning.[19,37] This can be the cause why professors do not perceive that the application of ICT lets them have more time to develop their teaching and research tasks. For communication through ICT, scarcity of its adoption was also observed by professors over 40 years of age, against the younger professors who are from a generation of digital natives.

In the section studying communication networks, we can observe that University Professor (M=1.75) and University Full Professor (M=2.33) are not consulted more than the rest in the research setting, as would be expected. On the contrary, data show that University School Full Professor is the most-consulted figure in teaching (M=2.86) and in research (M=2.81), probably because they are a majority group. With the expansion of Nursing in universities in Spain and the irruption of PhD programs in Nursing, this predisposition should change.[38] It is observed that the perception university professors have of their ICT skills has diminished after the Bologna Declaration. Given that it is a study centered on testing the degree of ICT use by the university teaching staff in four Spanish universities (Universities of Cantabria, Oviedo, Jaén, and León), we confirm the need for teaching methodological formation, and the use of didactic tools by using ICT, according to the suggestions established by Bologna.[26] We found it fundamental to pay special attention to the initial and permanent formation of the university teaching staff, promoting the figure of mentor in the implementation of the formation received when professors confront the preparation of their assignments with diverse ICT resources. Undoubtedly, access to prior experiences of good practices in the use of ICT will help to achieve the level of excellence required.

Limitations of the study. The procedures used in this work to elaborate the research instrument and collect the data can present some limitations. Although the search for the opinion questionnaires to draft the final questionnaire has been done by following a formal previously established protocol, some relevant studies could have been omitted because of the limitations of the institutional subscription to bibliographic databases at Universidad de Murcia. Also, 16% of the questionnaires sent were improperly completed, or not completed. Nevertheless, by treating these questionnaires as lost, we consider that the final sample obtained from 156 valid questionnaires is sufficient to reach significant conclusions.

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