Comparative research in the digital competence of the pre-service education teacher: face-to-face vs blended education and gender

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Abstract

To evaluate the digital competence of pre-service teacher, three sub-scales must be considered: attitude, knowledge and use. However, the degree of acquisition may vary depending on different variables. The main objective of this research is to find out the level of digital competence of university students based on these three sub-scales, and, as secondary objectives, to find out whether any differences exist in relation to students' educational modality and gender. A non-experimental design has been used (ex post facto) with a sample of 675 students from the Pontifical University of Salamanca. The results revealed that the level of digital competence of the pre-service education teacher is medium, with no significant differences in gender. However, differences were found in the Blended Learning modality.

KEYWORDS: Digital Competence; ICT; Students Profile; Educational Modality.

1. Introduction

Compared to some decades ago, the profile of university students has now changed. Modern-day students are part of a new generation who have grown up surrounded by technological devices, as well as all the possibilities offered by internet access. This has fostered the development of skills and attitudes towards Information and Communication Technologies (ICT) in any social and educational context (Ojando et al., 2017).

Current university students can be considered as "net generation" or "digital natives" (Thompson, 2013; Bowe & Wohn, 2015). However, even if said students are called "digital natives", this does not ensure that they have developed digital competence, and even if they have, it would be necessary to find out the level of acquisition that they possess (Barak, 2018). In this sense, Kennedy and colleagues (2007), point out that, as a general rule, students' digital competence focuses on the development of skills, attitudes and knowledge of technologies in social and playful contexts, and does consider their transfer to educational contexts, which propitiate optimal teaching-learning processes, which is necessary for the successful construction of knowledge.

It is no longer enough to have digital literacy, understood as the minimum set of skills that allow a user to operate effectively with software tools, access to the internet or perform basic tasks with a computer (Buckingham, 2015; Van Laar et al., 2017). Nowadays,

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it is necessary to go one step further than digital literacy towards digital competence, which is understood as the domain of ICT in a professional context with good pedagogical-didactic judgment (Krumsvik, 2011). According to Ferrari (2012), digital competence can be defined as a set of knowledge, skills and attitudes towards ICT and digital media. On the same lines, Council (2006) defines it as the knowledge, skills and attitudes that a user must have to work, live and learn in a knowledge society. Different dimensions should be included in the development of digital competence: a first dimension that encompasses basic digital competences (use of ICT tools, access to information etc.); a second dimension constituted by didactic competence in ICT management, where technology is understood at the service of pedagogy; and a third dimension, shaped by the development of the competence to learn through ICT, i.e., its use transversally (Krumsvik, 2007).

In this current socio-educational background, teacher training institutions have to focus on a good educational quality training in order to ensure the incorporation of future teachers into the labour and professional market (Kaufman, 2015; Maxwell and Schwimmer, 2016). This is because technological education now plays a vital role in the learning that takes place (Tondeur et al., 2016). In recent years, much research has been conducted on the perception of future teachers about the knowledge, use, implementation and integration of ICT in the teaching process (Casillas et al., 2017), since having a basic knowledge of ICT is no longer enough. Instead, it is fundamental that teachers have the necessary skills, knowledge and attitudes to carry out the teaching-learning process effectively (Baylor & Ritchie, 2002).

The purpose of this research is: (1) to know the level of digital competence of the pre-service education teacher and (2) to compare the level of digital competence according to the educational modality and gender.

2. Related Woks

2.1 Digital Competence in Different Educational Modalities

During the last decade, a new educational modality called Blended Learning has emerged, which combines face-to-face teaching and online teaching (Hannay & Newvine, 2017) and reduces the time spent attending classes (Asarta & Schmidt, 2017). Thus, it provides an enriching experience that combines the benefits of new technologies with face-to-face social interaction (Van Doorn & Van Doorn, 2014). In addition, Blending Learning allows students to optimise their learning at their own pace (Arbaugh, 2014) since the focus of attention in the teaching-learning process their own learning (Bartolome, 2004), even if teachers continue to play a fundamental role in providing structure,

organisation and learning experiences to students (Megeid, 2014; Aldhafeeri, 2015; Broadbent, 2017), providing them resources which facilitate explore and develop new skills. This type of methodology allows them to develop new skills and abilities (Carranza & Caldera, 2018).

The potential of these courses, therefore, is to grant students more responsibility, control and independence, as well as to improve their critical and reflective abilities (Garrison & Kanuka, 2004). Students themselves have found Blended Learning to provide positive results (Davies et al., 2013, Garcia et al., 2013, Hannay & Newvine, 2017), improving their academic performance, specifically when compared to the face-to-face modality (Albert & Beatty, 2014; Baepler et al., 2014).

Regarding students' perception, Eryilmaz (2015) carried out a pre-experimental study to measure the affectivity of Blended Learning, comparing it with the face-to-face modality (N = 110) in Atilim University, Ankara (Turkey). The results showed statistically significant differences in the opinions of students (p = 0.001), thus showing that the face-to-face modality was more effective. On the same lines, Tseng and Walsh (2016) compared and evaluated the perceptions, motivations and academic results of a total of 52 students, which were divided into two groups: Blended Learning and face-to-face. The results showed that the students in the Blended Learning modality had a higher motivation (p = 0.045), although there were no significant differences in academic performance (p = 0.192).

In relation to academic performance, Al-Qahtani and Higgins (2012) conducted a study with 148 students from A-Qura University in Saudi Arabia. The results showed that there were statistically significant differences between the Blended Learning modality and face-to-face learning (p = 0.001), with an effect size of 1.34 (Hedges'g), indicating that Blended Learning had a positive impact on improving student performance. These results are consistent with those obtained in other studies (Lewis & Harrison, 2012 Harjoto, 2017).

On the contrary, there are other investigations where no statistically significant differences have been found between the two educational modalities (Ashby et al., 2011; Aly, 2016).

Considering the existing literature regarding both educational modalities, it is clear that there is no consensus on the results obtained by the different investigations. On the other hand, it is noteworthy that most of the studies are focused primarily on analysing the perception and performance of students. There is more limited literature regarding the comparison of the digital competence of students in different educational modalities (Garcia et al., 2013). For this reason, this work focuses the interest on analysing the digital competence of students, specifically comparing Blended Learning with face-to-face learning.

2.2 Digital Competence According to Gender

In terms of gender, there are numerous studies which consider there to be considerable differences between males and females. For example, many researchers have found males to have a greater preference for ICT than females (Incantalupo et al., 2013; Balta & Duran, 2015; Ilkan et al., 2017; Seok & DaCosta, 2017). These results are corroborated by other authors where males obtained better results in digital competence (Casillas et al., 2017; Flores & Roig, 2017; Cabezas et al., 2017). Toundeur and colleagues (2016) conducted a study with 1,138 university students in Flanders (Belgium). The results showed that females had a less favourable attitude towards ICT than males, although there were no differences in educational contexts. On the other hand, there are authors who have determined that women have a higher digital competence than men (Suri & Sharma, 2013; Aesaert & Van Braak, 2015; Krumsvik et al., 2016; Guillén-Gámez et al., 2019).

On the contrary, there are studies where no statistically significant differences have been found in digital competence with respect to gender (Stosic & Fadiya, 2017, Vázquez-Cano et al., 2017; Dauda et al., 2017; Ayanda & Jibrin, 2018).

2.3 Digital Competence According to its Three Dimensions: Knowledge, Attitude and Use

There are studies that analyse the different dimensions that make up digital competence (Incantalupo et al., 2014; Onwuagboke & Singh, 2016; Petko et al., 2017; Bindu, 2017,). Kandasamy & Shah (2013) conducted a study with 100 primary education teachers whose results revealed that these teachers had knowledge about the use of applications, such as MS Word and Power Point, email and internet exploration. Most of them had a positive attitude towards the use of ICT. Taking gender into account, Tezci (2010) concluded that male teachers obtained higher scores in terms of knowledge and use, as well as a more positive attitude than female teachers.

However, other studies affirm that, although teachers have positive attitudes towards ICT, they lack the necessary knowledge to put it into practice in an appropriate way from a pedagogical point of view (Tezci, 2010; Mahmud & Ismail, 2010; Slechtova, 2014; Ilkan et al., 2017; Fadiya, 2017). On the same lines, Prior and colleagues (2016) conducted a study with 151 university students, concluding that a positive attitude towards ICT and adequate digital literacy contribute significantly to the development of digital competence through the ability to learn. These results are corroborated by those obtained by Adewole-Odeshi (2014). On the contrary, other researchers have concluded that teachers have a negative attitude towards ICT (Uluyol & Sahin, 2014; Dauda et al., 2018; Guillén-Gámez et al., 2018).

The attitude of use has also been related to other variables, such as years of experience or age, and the degree or level of study (Volman et al., 2005; Kubiatko, 2010; Slechtova, 2014; Adebara et al., 2017). Some studies have concluded that those at a younger age have a less positive attitude towards the use of ICT (Tezci, 2010; Balta & Duran, 2015).

Considering the scientific literature, there is hardly any research which compares the level of digital competence of the pre-service education teacher in different educational modalities (face to face vs. blended learning) as well as in gender. Therefore, this research aims to assess the level of digital competence of pre-service teacher in different educational modes according to gender.

3. Methods

Design: A non-experimental, ex-post facto cutting design was used. A descriptive analysis, followed by an inferential one, has been carried out. The level of significance established was sig. <0.05, which meant working with 95% confidence and 5% error.

Participants: A non-probabilistic sample has been used intentionally. The sample consisted of a total of 675 pre-service teacher enrolled in the Faculty of Education of the Pontifical University of Salamanca (UPSA). Data collection was carried out in the 2018/2019 academic year. The predominant gender was female (60%) with an average age of 27 years compared to male (40%) with an average age of 24 years; while the number of students in the classroom modality was higher (61.63%) compared to Blended Learning (38.37%).

Description of Educational Modalities: Students enrolled in the Blended Learning modality had to attend in person and mandatory once every month (in total 4 times in the semester). The time of each subject depended on the credits of each subject (between 1 and 2 hours), and a compulsory virtual assistance of 21 hours per semester. On the other hand, students enrolled in the classroom modality attend class with a total of 60 hours per semester.

Instrument. For the collection of the data for this research, the ACUTIC instrument was used (Mirete, 2015), which has been applied in different types of samples and educational stages (Mirete, 2016; Guillén-Gámez & Peña, 2020). The original instrument showed good results of reliability for its subsequent application.

The ACUTIC is composed of three-dimensions, attitude, knowledge and use. It consists of 31 Likert-type items of 5 points, however, the authors consider adding two more items on the knowledge and use about the creation of interactive questionnaires (Googleforms, Socrative, QuizWorks). Therefore, the final version of the instrument had 33 items. In this questionnaire, the

students must respond according to their degree of agreement with the proposed statement (for the attitudes dimension: from completely disagree (0 points) to fully agree (4 points); and for the knowledge dimension: from no knowledge (0 points) to very high knowledge (4 points); and finally, for the use dimension: from no use (0 points) to always use it (4 points).

The attitudes towards ICT dimension was composed of 7 items focused on thoughts, beliefs or attitudes towards ICTs (e.g. ICT promote involvement in the teaching and learning processes). Taking into account the Likert scale used, the maximum score to be reached by a participant in this dimension was 28 points. The knowledge dimension consisted of 13 items related to knowledge or training towards digital technologies, web resources or 2.0 tools (e.g. knowledge in Libraries and digital databases: Dialnet, Theseus, Wos, Scopus). The maximum score to be reached in this dimension is 52 points. Finally, the use dimension was composed of the same 13 items as the knowledge dimension, with the difference of focusing on the use that students make about them (e.g. use of data analysis software: SPSS, R, Mystat, Nud.ist, Nvivo, Atlas.ti). The maximum score to be reached in this dimension is 52 points. Finally, the maximum total score in the ACUTIC is 132 points.

The overall reliability of the instrument was calculated through Cronbach's alpha with a very satisfactory value (α = .932). Specifically, this reliability was calculated for each of the dimensions of the instrument through the Cronbach, Spearman-Brown and Guttman Alpha coefficients (Table 1). All of them very satisfactory.

		N= 675
Attitudes (AD)	Alfa de Cronbach	.932
	Coeficiente de Spearman-Brown	.886
	Dos mitades de Guttman	.871
Knowledge (KD)	Alfa de Cronbach	.899
	Coeficiente de Spearman-Brown	.782
	Dos mitades de Guttman	.779
Use (UD)	Alfa de Cronbach	.860
	Coeficiente de Spearman-Brown	.679
	Dos mitades de Guttman	.676

Table 1 - Reliability statistics of the three dimensions of the instrument.

4. Results

4.1 Total Digital Competence of Students According to the Instrument's Scales

Table 2 presents the descriptive data in each of the scales (the score of each scale is composed of the sum of the score of the items that compose it), showing the mean (M), standard deviation (SD), asymmetry (A) and kurtosis (K). It is observed how the students have a medium-low knowledge and use of ICT (knowledge =

27.69; use = 25.93) with respect to the attitude scale which is quite favourable (M = 21.72). Regarding the total digital competence, the students show that they have a medium competence (M = 75.34).

Scale	M	SD	A	K
Attitude (AD, 28 points)	21.72	4.94	-0.88	.82
Knowledge (KD,52 points)	27.69	9.55	.20	-.08
Use (UD, 52 points)	25.93	9.02	.40	.32
ACUTIC (132 points)	75.34	19.87	.08	.66

Table 2 Descriptive data of the degree of acquisition of digital competence

4.2 Digital Competence of Students According to Modality and Gender

Table 3 analyses the differences in gender within each educational modality, while Table 4 compares educational modalities based on gender. It can be seen that in the total scale (KS= .056; sig. > .05), the data follows a normal distribution; therefore, the parametric t-student test was used to check the difference of means between both distributions.

Table 3 shows how there are significant differences in the Blended Learning modality according to gender, but no differences are found in the students who study in the traditional modality. In addition, it is observed that in the total scale, males had a higher score than females. Regarding the effect size calculated through the d (cohen), it can be seen that the strength in the difference of means between both genders in the Blending Learning modality was .29.

According to the full scale of Table 4, it can be observed that there are only significant differences for males when comparing students of both educational modalities (sig .001), while for females, there are no significant differences (sig .066). Regarding the size of the effect, it can be observed that it is moderate in both scales. On the other hand, it can be seen that male students in the Blended Learning modality (BL) have a more favourable degree of digital competence than male students belonging to the face-to-face modality (Mface-to-face = 73.08; MBlended = 84.00). Although there are no significant differences for females, there is a difference of three points in terms of digital competence (Mface-to-face = 73.11; MBlended = 76.96).

5. Discussion

According to Mirete and colleagues (2015), knowing students' attitudes, knowledge and use of ICT can facilitate their inclusion in educational processes and the

transition towards an educational model centred on the student. Although current university students can be considered as "net generation" or "digital natives" (Thompson, 2013; Bowe & Wohn, 2015), the results obtained in this study reflect that the level of digital competence of university students is medium (M = 75.34 over 132 points).

Regarding the dimensions of digital competence, the results show that the attitude of students is quite favourable, similar to the results obtained by Kandasamy and Shah (2013). However, the scores reveal that the students consider that their knowledge and use of ICT is medium-low. These results coincide with studies that state that teachers and future teachers can have a favourable attitude towards ICT, yet lack the necessary knowledge (Mahmud & Ismail, 2010;

Slechtova, 2013; Ilkan et al., 2017; Stosic & Fadiya, 2017).

Tezci (2010) mentions that attitude affects knowledge, as well as its use. In our study, we have observed that a favourable attitude towards ICT correlates significantly with knowledge and with use. Following the line of other authors, such as Adewole-Odeshi (2014) and Prior and colleagues (2016), a positive attitude towards ICT and an adequate digital literacy can favour the development of digital competence.

In relation to gender, as in previous research (Stosic & Fadiya, 2017; Vázquez-Cano et al., 2017; Dauda et al., 2018), no statistically significant differences were found in this study considering the total sample.

Regarding the comparison of both modalities classified by gender, the scores were higher in the Blended

| | | Sex | M | SD | A | K | KS | | t-Student | | |
							Statistical	Sig.	t	Sig.	d (cohen)
AD	Face-to-face	M	21.47	4.45	-0.87	1.35	0.118	0.001	-.103	0.918	-
		F	21.51	4.82	-0.92	1.34	0.094	0.001			
	Blended Learning	M	22.46	5.56	-0.93	0.04	0.160	0.001	.673	.502	.10
		F	21.96	5.36	-0.91	0.54	0.130	0.001			
KD	Face-to-face	M	27.03	8.15	0.16	0.13	0.060	0.055	.660	.510	-
		F	26.47	9.04	0.24	0.23	0.092	0.001			
	Blended Learning	M	31.55	11.59	-0.08	-0.87	0.102	0.063	2.085	.039	.29
		F	28.28	10.36	0.08	-0.23	0.081	0.004			
UD	Face-to-face	M	24.58	7.39	0.19	0.08	0.055	0.098	-.816	.415	-
		F	25.21	8.28	0.38	0.32	0.066	0.040			
	Blended Learning	M	29.98	10.95	0.12	-0.22	0.066	0.200	2.175	.032	.30
		F	26.73	10.20	.45	-0.06	0.089	0.001			
TOTAL	Face-to-face	M	73.08	16.04	0.05	0.51	0.047	0.200	-.69	.945	-
		F	73.20	18.50	0.02	0.92	0.049	0.200			
	Blended Learning	M	84.00	25.02	-0.11	-0.42	0.054	0.200	2.083	.040	.29
		F	76.96	22.12	-0.13	0.66	0.056	0.200			

Table 3 - Descriptions and significance of both modalities comparing gender.

| | | | M | SD | A | K | Statistical | | | t-Student | | |
							KS	gl	Sig.	t	Sig.	d (cohen)
AD	Male	Face-to-face	21.47	4.47	-0.87	1.35	0.118	221	0.001	-1.379	.171	-
		BL	22.46	5.56	-1.00	0.34	0.160	71	0.001			
	Female	Face-to-face	21.49	4.82	-0.91	1.33	0.094	194	0.001	-0.896	.371	-
		BL	21.96	5.36	-0.89	0.40	0.130	188	0.001			
KD	Male	Face-to-face	27.03	8.15	0.16	0.13	0.060	221	0.055	-3.050	.003	.42
		BL	31.55	11.59	-0.17	-0.87	0.102	71	0.063			
	Female	Face-to-face	26.43	9.05	0.25	0.24	0.093	194	0.001	-1.856	.064	-
		BL	28.28	10.36	0.10	-0.22	0.081	188	0.004			
UD	Male	Face-to-face	24.58	7.39	0.19	0.08	0.055	221	0.098	-3.887	.000	.53
		BL	29.99	10.94	0.13	-0.23	0.066	71	0.200			
	Female	Face-to-face	25.19	8.30	0.39	0.31	0.068	194	0.028	-1.614	.107	-
		BL	26.73	10.20	0.27	-0.12	0.089	188	0.001			
TOTAL	Male	Face-to-face	73.08	16.04	0.05	0.51	0.047	221	0.200	-3.458	.001	.47
		BL	84.00	25.02	-0.23	-0.30	0.054	71	0.200			
	F	Face-to-face	73.11	18.51	0.03	0.93	0.051	194	0.200	-1.845	.066	-
		BL	76.96	22.11	-0.10	0.62	0.056	188	0.200			

Table 4 - Descriptions and significance in gender comparing both modalities.

Learning modality than the face-to-face modality, with statistically significant differences only for males. These results coincide with previous studies (Al-Qahtani & Higginst, 2012; Lewis & Harrison, 2012; Harjoto, 2017) in which Blended Learning had a positive impact on improving student performance.

6. Conclusions

In today's society, digital competences are becoming increasingly relevant and necessary to function both personally and professionally. Future teachers need to be able to facilitate teaching-learning processes through ICT that allows the development of digital skills in their students from the earliest stages. In this study, it has been observed that the general level of digital competence of university students is medium. Although their attitude toward ICT is favourable, their knowledge and use are medium-low.

One of the limitations of this study was the size of the sample, since only students in the Faculty of Education at one university were considered. In future studies, the sample could be expanded, observing whether there are differences depending on the type of university, its geographical location, as well as for degrees. In the same way, it would be interesting to find out and compare the degree of digital competence of students with that of their teaching staff.

The results of the study indicate the need to improve educational quality regarding training in digital competences of future teachers. More studies are needed to analyse the explanatory factors of this situation, as well as the demographics and social, psychological, educational and cultural impacts. Furthermore, future studies must address the implementation of strategies and actions that contribute to an improvement of the digital competence of university students. For example, it would be interesting to consider a mixed method approach as strength, since a methodology with quantitative techniques backed by a qualitative methodology through oral interviews on the students' points of view, would add richness to the interpretation of the data.

References

Adebara, O. V., Adebara, O. I., Olaide, R., Emmanuel, G. O., & Olanrewaju, O. (2017). Knowledge, attitude and willingness to use health technology among doctors at a semi urban tertiary hospital in Nigeria. Journal of Advances in Medicine and Medical Research, 22(8), 1-10. http://doi.org/10.9734/JAMMR/2017/33232

Adewole-Odeshi, E. (2014). Attitude of students towards e-learning in South-West Nigerian

Universities: An Application of Technology Acceptance Model. Library Philosophy and Practice (e-journal), 1035. Available on line at: http://digitalcommons.unl.edu/libphilprac/1035.

Aesaert, K., & Van Braak, J. (2015). Gender and socioeconomic related differences in performance based ICT competences. Computers & Education, 84, 8-25. https://doi.org/10.1016/j.compedu.2014.12.017

Albert, M., & Beatty, B. J. (2014). Flipping the classroom applications to curriculum redesign for an introduction to management course: Impact on grades. Journal of Education for Business, 89(8), 419-424. https://doi.org/10.1080/08832323.2014.929559

Aldhafeeri, F. M. (2015). Blended learning in higher education. In International Handbook of E-Learning Volume 2 (pp. 121-132). Routledge.

Al-Qahtani, A., & Higginst, S. E. (2012). Effects of traditional, blended and e-learning on students' achievement in higher education. Journal of Computer Assisted Learning, 29, 1-15. http://doi.org/10.1111/j.1365-2729.2012.00490.x

Aly, I. (2016). Comparison of students' performance in a managerial accounting course taught in blended learning, traditional classroom, and online setting. Quarterly Review of Business Disciplines, 2(4), 325-336.

Arbaugh, J. B. (2014). What might online delivery teach us about blended management education? Prior perspectives and future directions. Journal of Management Education, 38(6), 784-817. https://doi.org/10.1177/1052562914534244

Asarta, C. J., & Schmidt, J. R. (2017). Comparing student performance in blended and traditional courses: Does prior academic achievement matter? The Internet and Higher Education, 32, 29-38. https://doi.org/10.1016/j.iheduc.2016.08.002

Ashby, J., Sadera, W. A., & McNary, S. W. (2011). Comparing student success between developmental math courses offered online, blended, and face-to-face. Journal of Interactive Online Learning, 10(3), 128-140.

Baepler, P., Walker, J. D., & Driessen, M. (2014). It's not about seat time: Blending, flipping, and efficiency in active learning classrooms. Computers & Education, 78, 227-236. https://doi.org/10.1016/j.compedu.2014.06.006

Balta, N., & Duran, M. (2015). Attitudes of Students and Teachers towards the Use of Interactive Whiteboards in Elementary and Secondary Schools Classrooms. TOJET: The Turkish Online Journal of Educational Tecnology, 14(2), 15-21.

Barak, M. (2018). Are digital natives open to change? Examining flexible thinking and resistance to change. Computers & Education, 121, 115-123. https://doi.org/10.1016/j.compedu.2018.01.016

Bartolomé Pina, A. (2004). Blended learning. Conceptos básicos. [Blended learning Basic concepts]. Pixel-bit, 23, 7-20.

Baylor, A. L., & Ritchie, D. (2002). What factors facilitate teacher skill, teacher morale, and perceived student learning in technology-using classrooms? Computers and Education 39, 395-414. https://doi.org/10.1016/S0360-1315(02)00075-1

Bindu, C. N. (2017). Attitude towards, and Awareness of Using ICT in Classrooms: A Case of Expatriate Indian Teachers in UAE. Journal of Education and Practice, 8(1), 10-17.

Bisquerra, R. (2004). Metodología de la investigación educativa. Madrid: Plaza.

Bowe, B. J., & Wohn, D. Y. (2015). Are there generational differences? Social media use and perceived shared reality. In Proceedings of the Social Media and Society Conference, 17, Toronto. New York, NY: ACM Press.

Broadbent, J. (2017). Comparing online and blended learner's self-regulated learning strategies and academic performance. The Internet and Higher Education, 33, 24-32. https://doi.org/10.1016/j.iheduc.2017.01.004

Buckingham, D. (2015). Defining digital literacy-What do young people need to know about digital media? Nordic Journal of Digital Literacy, 10, 21-35.

Cabezas, M., Casillas, S., Sanches-Ferreira, M., & Teixeira, F. L. (2017). Do Gender and Age Affect the Level of Digital Competence? A Study with University Students. Fonseca, Journal of Communication, 15, 109-125. http://doi.org/10.14201/fjc201715109125

Casillas, S., Cabezas, M., Ibarra, M. S., & Rodríguez, G. (2017). Evaluation of digital competence from a gender perspective. In Proceedings of the 5th International Conference on Technological Ecosystems for Enhancing Multiculturality, 18(20), 1-5. https://doi.org/10.1145/3144826.3145372

Carranza Alcántar M.R. y Caldera Montes J.F. (2017). Percepción de los Estudiantes sobre el Aprendizaje Significativo y Estrategias de Enseñanza en el Blended Learning [Student Perception of Significant Learning and Teaching Strategies in Blended Learning]. REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación, 16(1), 73-88. https://doi.org/10.15366/reice2018.16.1.005

Council, E. (2006). Recommendation of the European Parliament and the Council of 18 December 2006 on key competencies for lifelong learning. Brussels: Official Journal of the European Union, 30(12), 2006.

Dauda, M., Ayanda, M., & Jibrin, A. (2018). Analysis of Students' Attitude Towards the Use of Information and Communication Technology in Nigerian Tertiary Institutions. ATBU Journal of Science, Technology and Education, 6(1), 100-105. Available on line at: http://www.atbuftejoste.com/index.php/joste/article/view/487

Davies, R. S., Dean, D. L., & Ball, N. (2013). Flipping the classroom and instructional technology integration in a college-level information systems spreadsheet course. Educational Technology Research and Development, 61(4), 563-580. https://doi.org/10.1007/s11423-013-9305-6.

Eryilmaz, M. (2015). The Effectiveness of Blended Learning Environments. Contemporary Issues in Education Research, 8(4), 251-256.

Ferrari, A. (2012). Digital competence in practice: An analysis of frameworks. JRC Technical Report, 1-91. http://doi.org/10.2791/82116

Flores, C., & Roig, R. (2017). Gender and its impact on Pedagogy students' self-perceived digital competence. International Journal of educational research and innovation (IJERI), 79-96

Garcia, I., Escofet, A., & Gros, B. (2013). Students' attitude towards ICT learning uses: A comparison between digital learners in blended and virtual universities. European Journal of Open, Distance and E-learning, 16 (2). Available online at: http://www.eurodl.org/index.php?p=special&sp=articles&inum=5&article=625&article=624

Garrison, D. R., & Kanuka, H. (2004). Blended learning: Uncovering its transformative potential in higher education. The internet and higher education, 7(2), 95-105. https://doi.org/10.1016/j.iheduc.2004.02.001

Guillén-Gámez, F. D., & Peña, M. P. (2020). Análisis Univariante de la Competencia Digital en Educación Física: un estudio empírico [Univariate Analysis of the Digital Competence in Physical Education: an empirical study]. Retos, 37, 326-332.

Guillén-Gámez, F. D., Lugones, A., & Mayorga-Fernández, M. J. (2019). ICT use by pre-service foreign languages teachers according to gender, age and motivation. Cogent Education, 1-17. https://doi.org/10.1080/2331186X.2019.1574693

Guillén-Gámez, F. D., Mayorga-Fernández, M. J., & Álvarez-García, F. J. (2018). A Study on the Actual

Use of Digital Competence in the Practicum of Education Degree. Technology, Knowledge and Learning, 1-18. https://doi.org/10.1007/s10758-018-9390-z

Hannay, M., & Newvine, T. (2006). Perceptions of distance learning: A comparison of online and traditional learning. MERLOT, Journal of online learning and teaching, 2(1), 1-11. Available online at: http://jolt.merlot.org/05011.htm

Harjoto, M. A. (2017). Blended versus face-to-face: Evidence from a graduate corporate finance class. Journal of Education for Business, 92(3), 129-137. https://doi.org/10.1080/08832323.2017.1299082

He, T., & Zhu, C. (2017). Digital informal learning among Chinese university students: the effects of digital competence and personal factors. International Journal of Educational Technology in Higher Education, 14(1), 14-44. https://doi.org/10.1186/s41239-017-0082-x

Ilkan, M., Bheshti, M., Rahimi, S., & Atalar, E. (2017). The role of Information and Communication Technology (ICT) in Tourism Education: A Case Study of Higher Education Students. REP. Available online at: http://i-rep.emu.edu.tr:8080/xmlui/handle/11129/3491

Incantalupo, L., Treagust, D., & Koul, R. (2013). Measuring student attitude and knowledge in Technology-Rich Biology Classrooms. Journal of Science Education and Technology, 23, 98-107. http://doi.org/10.1007/s10956-013-9453-9.

Incantalupo, L., Treagust, D. F., & Koul, R. (2014). Measuring student attitude and knowledge in technology-rich biology classrooms. Journal of Science Education and Technology, 23(1), 98-107. https://doi.org/10.1007/s10956-013-9453-9

Kandasamy, M., & Shah, P.B.H. (2013). Knowledge, attitude and use of ICT among ESL Teachers. GSE Journal of Education, 185-199.

Kaufman, K. (2015). Information communication technology: challenges & some prospects from preservice education to the classroom. Mid-Atlantic Education Review, 2(1), 1-11. Available online at: http://maereview.org/index.php/MAER/article/view/1

Kennedy, G., Dalgarno, B., Gray, K., Judd, T., Waycott, J., Bennett, S. J., Maton, K. A., Krause, K., Bishop, A., Chang, R., & Churchwood, A. (2007). The Net Generation are not big users of Web 2.0 technologies: preliminary findings. In R. Atkinson, C. McBeath, S. Soong & C. Cheers (Eds.), Annual Conference of the Australasian Society for Computers in Learning in Tertiary Education (pp. 517-525). Singapore: Nanyang Technology University.

Krumsvik, R. J. (2007). Skulen og den digitale læringsrevolusjonen. Oslo: Universitets for laget.

Krumsvik, R. J. (2011). Digital competence in the Norwegian teacher education and schools. Högre utbildning, 1(1), 39-51.

Krumsvik, R. J., Jones, L. Ø., Øfstegaard, M., & Eikeland, O. J. (2016). Upper secondary school teachers' digital competence: Analysed by demographic, personal and professional characteristics. Nordic Journal of Digital Literacy, 11(03), 143-164. http://doi.org/10.18261/issn.1891-943x-2016-03-02

Kubiatko, M. (2010). CZECH University students' attitudes towards ICT used in science education. Journal of Technology and Information Education, 2(3), 20-25.

Lewis, J. S., & Harrison, M. A. (2012). Online delivery as a course adjunct promotes active learning and student success. Teaching of Psychology, 39(1), 72-76.

Mahmud, R. & Ismail, M.A. (2010). Impact of Training and Experience in Using ICT on In-Service Teachers' Basic ICT Literacy. Malaysian Journal of Educational Technology, 10(2), 5-10.

Maxwell, B., & Schwimmer, M. (2016). Professional ethics education for future teachers: A narrative review of the scholarly writings. Journal of Moral Education, 45(3), 354-371.

Megeid, N. S. A. (2014). E-learning versus blended learning in accounting courses. Quarterly Review of Distance Education, 15(2), 35-55.

Mirete Ruiz, A. B. (2016). El Profesorado Universitario Y Las Tic. Análisis De Su Competencia Digital [University Teaching and ICT. Analysis of Your Digital Competence]. Ensayos: Revista de la Facultad de Educacion de Albacete, 31(1), 133-147. https://doi.org/10.18239/ensayos.v31i1.1033

Mirete, A. B., Sánchez, F. A. G., & Pina, F. H. (2015). Cuestionario para el estudio de la actitud, el conocimiento y el uso de TIC (ACUTIC) en Educación Superior. Estudio de fiabilidad y validez [Questionnaire for the study of the attitude, knowledge and use of ICT (ACUTIC) in Higher Education. Reliability and validity study]. Revista interuniversitaria de formación del profesorado, 83, 75-89.

Ojando, E. S., Benito, M., & Prats, M. À. (2017). Students as digital leaders in the classroom. Aloma: Revista de Psicologia, Ciències de l'Educació i de l'Esport Blanquerna, 35(1), 53-60.

Onwuagboke, B. B. C., & Singh, T. K. R. (2016). Faculty attitude and use of ICT in instructional delivery in tertiary institutions in a developing

nation. International Journal of Research Studies in Educational Technology, 5(1), 77-88.

Petko, D., Cantieni, A., & Prasse, D. (2017). Perceived quality of educational technology matters: A secondary analysis of students' ICT use, ICT-related attitudes, and PISA 2012 test scores. Journal of Educational Computing Research, 54(8), 1070-1091. https://doi.org/10.1177/0735633116649373

Prior, D., Mazanov, J., Meacheam, D., Heaslip, G., & Hanson, J. (2016). Attitude, digital literacy and self efficacy: Flow-on effects for online learning behavior. Internet and Higher Education, 29, 91-97. http://dx.doi.org/10.10146/j.iheduc.2016.01.001.

Seok, S., & Da Costa, B. (2017). Gender Differences in Teens' Digital Propensity and Perceptions and Preferences with Regard to Digital and Printed Text. Tech Trendes, 61, 171-178. http://doi.org/10.1007/s11528-016-0134-4

Slechtova, P. (2014). Attitudes of undergraduate students to the use of ICT in education. Procedia-Social and Behavioral Sciences, 171, 1128-1134. http://doi.org/10.1016/j.sbspro.2015.01.218.

Stosic, L., & Fadiya, S.O. (2017). The attitudes of students towards the use of ICT during their studies. Russian Psychological Journal, 14(1), 135-148. Doi: 10.21702/RPJ.2017.1.9

Suri, G., & Sharma, S. (2013). The impact of gender on attitude towards computer technology and e-learning: An exploratory study of Punjab University, India. International Journal of Engineering Research, 2(2), 132-136.

Thompson, P. (2013). The digital natives as learners: Technology use patterns and approaches to learning. Computers & Education, 65, 12-33. https://doi.org/10.1016/j.compedu.2012.12.022

Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use: Its meaning and measurement. Computers & Education, 94, 134-150. https://doi.org/10.1016/j.compedu.2015.11.009

Tondeur, J., Van de Velde, S., Vermeersch, H., & Van Houtte, M. (2016). Gender differences in the ICT Profile of University Students: A Quantitative Analysis. Journal of Diversity and Gender Studies, 3(1), 57-77.

Tseng, H., & Walsh, E. J. (2016). Blended vs. Traditional Course Delivery: Comparing Students' Motivation, Learning Outcomes, and Preferences. Quarterly Review of Distance Education, 17(1), 1-21.

Uluyo, C., & Sahin, S. (2014). Elementary school teachers' ICT use in the classroom and their motivators for using ICT. British Journal of Educational Technology, 1-11. http://doi.org/10.1111/bjet.12220.

Van Doorn, J. R., & Van Doorn, J. D. (2014). The quest for knowledge transfer efficacy: blended teaching, online and in-class, with consideration of learning typologies for non-traditional and traditional students. Frontiers in psychology, 5, 324, 1-14. https://doi.org/10.3389/fpsyg.2014.00324

Van Laar, E., van Deursen, A. J., van Dijk, J. A., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. Computers in Human Behavior, 72, 577-588. https://doi.org/10.1016/j.chb.2017.03.010

Vázquez-Cano, E., Meneses, E. L., & García-Garzón, E. (2017). Differences in basic digital competences between male and female university students of Social Sciences in Spain. International Journal of Educational Technology in Higher Education, 14(1), 14-27. https://doi.org/10.1186/s41239-017-0065-y.

Volman, M., Van Eck, E., Heemskerk, I., & Kuiper, E. (2005). New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education. Computers & Education, 45(1), 35-55. https://doi.org/10.1016/j.compedu.2004.03.001