Digital Security in Educational Training Programs: A Study based on Future Teachers' Perceptions
Latorre-Medina, María José; Tnibar-Harrus, Chaimae

Veröffentlichungsversion / Published Version
Zeitschriftenartikel / journal article

Mitglied der
Leibniz-Gemeinschaft

gesis
Leibniz-Institut
für Sozialwissenschaften

Diese Version ist zitierbar unter / This version is citable under:
https://nbn-resolving.org/urn:nbn:de:0168-ssoar-87989-0

María José Latorre-Medina
Doctor of Sciences Education, Associate Professor of
Department of Teaching and School Organization Faculty of Education, Economy and Technology of Ceuta
University of Granada, Spain
ORCID ID 0000-0002-8185-2779
mjlator@ugr.es

Chaimae Tnibar-Harrus
Student teacher of Early Childhood Education Degree
Faculty of Education, Economy and Technology of Ceuta at the University of Granada, Spain
chaimaetnibar@correo.ugr.es

DIGITAL SECURITY IN EDUCATIONAL TRAINING PROGRAMS: A STUDY BASED ON FUTURE TEACHERS' PERCEPTIONS

Abstract. A key aspect of future teacher training in this highly digitalized period of education requires a specific focus on digital skills, especially in the area of security. This study delves into this issue by means of a quantitative, theoretical and systematic review of future teachers currently in training at the Faculty of Education, Economy and Technology of Ceuta of the University of Granada (Spain). The specific intention is to determine their perception of the instruction they receive on digital matters, concretely on cybersecurity during their phase of pre-service. To carry out the project, the study resorted to a descriptive method by submitting the participants to a specifically designed questionnaire entitled "Digital Security Competence Required for Teachers". Examinations of the psychometric properties of the questionnaire reveal its relevance and reliability. The intention, after applying descriptive and inferential statistics tests, was to determine whether students in pre-service training really feel competent on digital matters or if they feel need more theoretical-practical training, especially in the area of security. The general findings reveal that future female teachers pursuing a university degree in Early Childhood Education, although competent from the techno-pedagogical viewpoint, indicate that attaining a high level of competence in digital security requires more theoretical and practical training. Future male Primary Education teachers, by contrast, perceive themselves as competent in digital security. This perhaps stems from their training (courses and workshops) in Information and Communication Technologies (ICT) and the theoretical and practical instruction they received at the university during courses or during a practicum. This aspect deserves further research because, as highlighted elsewhere, higher education institutions must prioritize instruction on digital security in their teacher programs.

Keywords: digital competence; digital security; data protection; statistical analyses; teacher training

1. INTRODUCTION

The problem statement. Digitalization and its demands on educators of the 21st century is a major topic of research. Technology, more specifically, technological innovation, has grown exponentially over the last decades to the point that it now is an essential part of teaching [1]. A review of the academic literature confirms that the massive use of Information and Communication Technologies (ICT) by current globalized societies is having a great impact on the field of education [2]. In fact, numerous arguments see the need to integrate ICT into education as it not only assists in developing the skills required to function and coexist in Knowledge Societies, but yields potential benefits to the teaching and learning processes [3]. Other voices address the question of teacher digital competence while facing new educational challenges (diversity, multilingualism, pedagogical leadership, etc.) [4]. The Covid-19 health crisis is one of the most visible examples that has shook the foundations of conventional education. Moreover, academic research has largely explored its impact on promoting digitalization yielding results suggesting the need in this new techno-social environment of raising the level of digital competence of future education professionals.

Analyses of recent studies and publications. An aspect highlighted in the specialized literature on teacher training is the necessity of improving the level of digital competence [5] [6] as it is currently considered key to student teacher qualification [7]. Although several standards (Digital Competence Framework for Citizens, Digital Competence Framework for Educators, UNESCO, etc.) stress the importance of ICT training for future teachers, other research such as Yan [8], Shin [9] and De Waal and Grösser [10] point out that digital topics are hardly relevant for future teachers. This leads to wonder why higher education places such a high priority on digital security specifically in the framework of teacher training programs? Most research on digital literacy, in fact, focus on technological and informational dimensions and few address the need of imparting courses on digital security to future teachers [11], [12], [13] even though it is of essence to teacher training programs [14]. Furthermore, as digital security is viewed as crucial among the Global Skills index [15], higher education should prioritize it through training and holistic approaches [11] [12].

The research goal. Based on the notions advanced above, the main purpose of this study is to determine and analyze the perspectives, opinions and perceptions of ICT by future teachers pursuing degrees in Early Childhood and Primary Education at the Faculty of Education, Economy and Technology of the University of Granada in Ceuta (Spain). The interest is specifically to gain insight into the opinions of these students as to the theoretical-practical training they receive on digital security. The research questions guiding this study are the following:

a) What perception do future teachers report as to their level of competence in the area of digital security?

b) Are the digital skills of future teachers acquired through university courses or during a practicum?

c) Does gender play a role among future teachers as to their perception of their level of digital competence?

d) Do future teachers reveal differences of perception of their level of digital competence according to the type of university degree they are pursuing?

e) Are there differences among future teachers as to the perception of their levels of competence according to whether they carried out extra ICT training?

2. METHODS

The methodological framework of this study follows a quantitative approach specifically applying descriptive and correlational methods [16]. A non-experimental design was applied by means of a self-report questionnaire serving to collect their responses [17].

2.1. Sample

The questionnaire was completed during the current academic year (2022-2023) by a sample of 50 university students inscribed in courses of education (n=50). This population is further broken down into 23 students pursuing an Early Childhood Education degree and 27 pursuing a Primary Education degree. Following the attributes of non-probabilistic sampling, students meeting the inclusion criteria were intentionally chosen to participate [18].

In this case, the predefined criteria were the following:

− Student teachers that are currently in their final phase of teacher training at the Faculty of Education, Economy and Technology of Ceuta (University of Granada).

− Students teachers that have already completed a part of their university practical training (Practicum I).

− Student teachers currently immersed in acquiring didactic specialties.

It should be noted that student teachers in their fourth year of their degree in Primary Education follow more courses than other teachers in training, notably those specializing in Audition and Language (16.33% of the participants), Special Education (14.29%), Foreign Language (English) (14.29%) and Physical Education (10.20%).

2.2. The questionnaire

The next step of the study was to design a questionnaire to evaluate the perception of future teachers of their own digital competence. This *ad hoc* tool, entitled "Digital Security Competence Required for Teachers", consists of 51 items distributed into three techno-pedagogical dimensions:

1. Personal data: gender, age, type of degree and further training in ICT.
2. ICT teaching skills: 14 items related to the level of their pedagogical skills.
3. ICT competence: 37 items framed in the area of digital security classified according to INTEF criteria [23].

Several other highly valid questionnaires were consulted prior to carrying out the current study: Teacher Self-perception of Digital Competence (CACDD) [19], Digital Competence of Future Teachers (CDAES) [20], Digital Competence Required of Future Teachers (CCDFM) [21], etc. Concrete examples were likewise collected from the Reference Framework for Digital Teaching Competence (MRCDD) established by the National Institute of Educational Technologies and Teacher Training of Spain (INTEF) [22] assisted by representatives of the Spanish Ministry of Education. Moreover, the questionnaire's scales, in terms of format and typology, resemble those designed by Pérez [24]. The 51 items were then assessed by means two different scales:

1. A five-point Likert scale intended to gather information on how student teachers perceive their level of digital competence (1="Not capable"; 2="Little capable"; 3="Quite capable"; 4="Very capable"; and 5="Highly capable") [19].
2. Closed-ended questions related to where student teachers acquired their digital skills (during courses while pursuing their degree; during practicum; or both).

2.2.1. Assessing the reliability of the questionnaire

A Cronbach's alpha [25] test was applied to the entire sample to determine its reliability. As the index of 0.8 [26] is the coefficient required to determine reliability, the value of 0.96 (Table 1) garnered from the test indicates that the questionnaire possesses a high level of internal consistency.

Table 1

Reliability Statistics

Cronbach's alpha	Cronbach's alpha based on standardized elements	Number of elements
.973	.973	102

After the Cronbach α test, the homogeneity of the values of the questionnaire's 102 elements were determined to range between 0.972 and 0.973. Furthermore, none had any major effect on the value of the coefficient. Hence no element or item was omitted or deleted.

2.3. Data analysis

The data collected through the questionnaire was then submitted to a statistical treatment by means of the IBM SPSS Statistics version 23.0 software [26] so as to explore the following aspects:

1. Descriptive analyses: a first approach to the data from the questionnaire to gain an overview, its distribution (central and dispersion tendencies, frequencies, accumulation of percentages of each value…) and identify where the students acquired their digital competence.
2. Contingency analyses: an approach to determine if the level of digital competence of future teachers was conditioned by variables such as gender, type of degree and extra ICT training.

3. FINDINGS

3.1. Descriptive analysis

Two specific aims were outlined when initiating the descriptive analysis:

1. To determine the level of future teacher digital competence ("Not," "Little," "Quite," "Very" or "Highly capable") based on their responses to the questionnaire.
2. Identify the circumstances surrounding the acquisition of digital competence (while pursuing their university degree, during practicums, or both).

The findings, in what concerns the first aim, reveal that the central and dispersion values offer solid data, especially those linked to the security dimension. Concretely, the results of item 17 ("to what point are you able to correctly apply the policy of digital resources use to your emails and to PRADO?") offer the highest mean (X=3.94). Item 20 ("to what point are you able to constructively criticize and give advice to partners on the use of security mechanisms?"), in turn, reveals the lowest mean of the entire study (X=2.37). In fact, the issue related to item 20 points to a certain downward trend applicable to most of the participants.

Items 26 and 28 represent the shortcomings or deficits through values related to the use of shared content and ICT tools that promote peer learning and an autonomous management of cybersecurity programs (antispyware, antivirus, etc.). This point reveals that future teachers perceive themselves as possessing the minimum skills (individually and in groups) required to apply security protocols.

The participants nevertheless reveal an optimistic attitude exemplified by responding "very capable" to items 29 ("to what point are you able to access forums and blogs autonomously and systematically complying with the conditions of personal data and privacy?") and 30 ("to what point are you able to reflect with other colleagues on the use of digital systems?"). Moreover, in terms of digital security, the results suggest a high mean and a positive level of consensus (around 35%) to item 16 ("to what point are you able to promote a secure, legal and responsible use of information and digital resources?").

Other items linked to the area of "Protection of personal data" obtained acceptable ratings despite high standard levels of deviation (1.3). In this case, they suggest that future teachers are highly skilled in safeguarding their digital identity. Likewise, they are quite keen on managing access to educational environments, systematically encrypting the data, complying autonomously and systematically with measures of data protection, etc.

However, their responses to practical issues indicate they are "little capable" (30.6%) of "adapting ergonomic proposals to promote the physical health of children" (item 35). They are nonetheless good at identifying cyber risks associated with ICT use, threats resulting from technologies in coexistence plans, digital frauds, etc.

The future teachers reveal a high level of competence in the area of "Protection of the environment", in particular linked to items 49 ("to what point are you able to use computer equipment in a secure and healthy way from a sustainable point of view?") and 51 ("to what point are you capable to apply environmental measures in the management of technological waste?"). These values therefore allow concluding that the self-reporting by future teachers as to their competence in digital security is positive (about 36.7%).

The items related to the central dimension of the study that delve into conditions of privacy and intellectual property licenses reveal a standard deviation of 1.20 with minimum mean values of X=2.5 that reflect the poor impressions reported by future teachers of their prototypical skills related to cybersecurity.

Along these lines, those pursuing degrees in Early Childhood Education and Primary Education confirm their ability to "automatically configure two different profiles, academic and personal, on the computer and apply security policies" (item 27). They likewise confirm that they can "quote different types of web contents such as digital newspapers, blogs, journals for teacher training obtained randomly by an Internet bot" (item 48). Moreover, their self-reported levels increase noticeably when addressing ethical or deontological issues linked to the teaching profession (items 15 and 47).

An examination of these initial dimensions indicate that these students see themselves as having a very competent pedagogical profile in the field of techno-pedagogy, especially those in the early stages of training. This indicates that student teachers will, among their other activities, be able to accomplish the following tasks:
– Apply active methods by means of technologies.
– Design digital learning activities.
– Develop digital activities based on real problems.
– Improve instruction through the use of technological tools.
– Incorporate ICT into teaching-learning processes.

Despite these positive aspects, it must be noted that of all the techno-pedagogical skills acquired by future teachers, inclusion of technological innovation is perceived as the weakest. On the other hand, the scores applying the second scale clearly identify where these students acquired their digital abilities as the options of response of the 51 items are limited to two possible settings: during the university courses or during the practicum.

Among the initial dimensions stands out the first item ("to what point are you able to use and incorporate digital technologies in teaching-learning activities?") as it yields the study's highest centralization value (X=2.06). Examples of other skills acquired from the two different sources ("both") marked by a high mean (X=2.02) are evidenced by items 3 ("to what point are you able to design didactic activities for your students using ICT?"), 11 ("what is your level in explaining how to search for information and create digital products?") and 13 ("to what point are you able to understand the language, rules and symbols of social Internet tools such as forums, chats, networks, etc.?"). Thus the category "both" points to a general complementarity between both theoretical and practical training platforms (courses and the practicum).

Another statistically relevant result deriving from this binomial pertains to the digital citizenship dimension evidenced by a higher percentage of participants favoring it. The value of item 16 ("to what point are you able to promote and practice secure, legal and responsible uses of information and digital resources?") sheds even more light as it reveals that the prototypical premise of security was achieved during both courses and the practicum (40.8%).

Although no specific competence was acquired during the practicum, a comparison between the contextual variables suggests that the high percentage of "during practicum" are associated with techno-pedagogical items. This is evidenced concretely by the values of items 4 ("to what point do you feel able of developing didactic activities for your students with ICT

based on real problems?") and 10 ("to what point do you feel able to locate and describe experiences of good practices based on the use of digital resources?").

Contrary to the previous scale, the items linked to the areas of digital social/collaborative use and attention to diversity such as items 5 ("to what point do you feel able to develop strategies using ICT with students marked by different cognitive levels?"), 6 ("to what point do you feel able to program ICT activities that suit the diverse learning styles of students?") and 8 ("to what point are you able to use social and collaborative tools to promote creativity among your students?") confirm that the university courses followed while pursuing the degree foster digital competence.

Moreover, daily management of institutional digital media such as emails and the PRADO platform are skills students acquire while attending university courses. This is evidenced by the optimal values of items 9 ("effective search by means of ICT tools that facilitate communication and learning in virtual environments"), 12 ("greater access and management of information through ICT resources"), and especially, 18 scored with the highest percentage of the study (73.5%).

Future teachers have thus acquired during their courses the ability to cite and reference any web content (according to APA standards). Hence they are making responsible, ethical and legal use of the information in their academic work (items 46 and 47).

The scoring of items 19 ("to what point are you able to make use of the main security measures such as updating software or filtering private contents?") and 28 ("to what point do you feel able to apply security programs?") render it possible to conclude that although the training offered through courses at the university is a powerful source, it does not unilaterally consolidate ICT proficiency.

3.2. Contingency analyses

One of the objectives of this study was addressed by exploring potentially significant associations among different variables by means of contingency analyses.

3.2.1. Contingency analysis according to gender

This analysis clearly points to a significant association (99% confidence) between gender and a single variable of the questionnaire (item 4). In fact, around 23.1% of future female teachers affirm to possess the ability to analyze the conditions of privacy and their functional characteristics before resorting to collaborative platforms. This is also highlighted by the fact that 10.3% state to be "highly capable" in this respect. Most of the future male teachers likewise see themselves as possessing an advanced level in matters of security.

3.2.2. Contingency analysis according to type of degree

A special point of interest of this study is determining whether there is any significant link between the types of university degrees future teachers are pursuing and the variables of the questionnaire. A first indication is that this variable, unlike the other descriptive items, reveals the most associations (95% confidence).

The analysis of the association of variables with the type of degree pursued by future teachers points to a link between degree type and three variables framed in two main dimensions: security and techno-pedagogical skills. This requires first highlighting two variables connected to digital security. The first is that of the protection of personal data and identity among future teachers of Early Childhood Education yield identical percentages (31.8%) to two antagonistic responses ("little capable" *versus* "highly capable"). By contrast, most students pursuing degrees in Primary Education declare greater levels ("we are very capable of applying international standards when citing and referencing sources").

Another particularly significant association linked to the security dimension is manifested through the question: "to what point are you capable of analyzing environmental issues through the Internet?" To this future teachers of Early Childhood Education self-report acceptable levels (22.7%), whereas Primary Education students indicate a greater mastery of matters related to environmental technology (44.4%).

It is noteworthy that the differences between the two types of university degrees are eclipsed when dealing with the category of extreme techno-pedagogical proficiency. In this case 22.7% of the future teachers pursuing a degree in Early Childhood Education are in the forefront.

3.2.3. Contingency analysis related to extra ICT training for educational purposes

A significant association was detected only among a single variable ("to what point are you able to make use of security programs such as antispyware and antiviruses when downloading files from a repository or database?"). With a value of less than 0.05 (specifically 0.037), it represents only 1.96% of the total items (95% confidence). In fact, the results corroborate the hypothesis that "receiving extra training in ICT leads to positive self-perception" as 69.3% of the respondents benefitting from extra training through courses and workshops see themselves as "highly capable" of using security programs such as antiviruses and antispyware, whereas 30.8%, on the contrary, feel either "not at all" or "little capable" of using them.

The opposite occurs with the values of future teachers lacking in extra ICT training. In this case, only 8.3% not benefitting from extra training feel "highly capable". This allows assuming that student teachers benefitting from extra training are more at ease with security programs downloaded from a repository or database. Hence, there is a directly proportional relationship between extra-curricular training and self-reported competence.

An overview of the results garnered from the contingency analyses thus suggests that future female teachers of Early Childhood Education are techno-pedagogically competent. However, their level of competence in digital security, the issue of this study, is beneath that of future male teachers pursuing a degree in Primary Education, especially those having benefited from extra ICT training (courses or workshops).

4. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The levels of competence of future teachers in these times of post-truth and fake news, in particular those linked to digital security, serve as key indicators of educational training. This study, given its combination of technological and pedagogical aspects, highlights the weak digital security profile of future female teachers working towards a degree in Early Childhood Education. The findings reveal this group to be overshadowed by the positive assessment of competence by future male teachers in the fourth year of a degree in Primary Education who are likewise currently deep into their respective specializations (Audition and Language, Special Education, Physical Education, and Foreign Language). Throughout the study a representative dichotomy stands out among these different degrees offered by the Faculty of Education, Economy and Technology of Ceuta despite the modest size of the sample and the questionnaire being completed over a short period of time.

Another result worth highlighting is that male students of Primary Education, based on their self-reports, appear to be more competent in digital security than females working towards a Early Childhood Education degree specifically in two subareas of digital security ("Protection of devices" and "Protection of digital identity"). Meanwhile, differences between the groups of females are hardly visible regardless of the degree they pursue. Actually, the results indicate that future female teachers of Early Childhood and Primary Education attained similar scores

for the items related to the initial dimensions of the questionnaire ("ICT teaching skills"). It is likewise possible to observe that the majority of participants pursuing a degree in Early Childhood and Primary Education reveal a high level related to the issues of "Health Protection" and "Environmental Protection". In fact, close to 30% of those surveyed report feeling "quite capable" in these areas.

On the other hand, the factor of degree type appears to also overlap with another borderline variable, notably the uneven number of credits of subjects linked to ICT. This is vital as it is well known that digital training deficiencies are potentially one of the main reasons of the failure to integrate ICT into teaching curricula. In this respect, it is also important to point out that the participants do not affirm to have acquired digital competence during the practicum but during their university courses. It is also worth noting that in each of the two degrees there is only one course offering instruction on the use of these technologies.

The results of this study therefore suggest a turning point when weight is placed by respondents on acquiring ICT teaching procedures/skills and other technological abilities from each of the two courses offered by the university degree as well as during the practicum.

In short, the rethinking of Information and Communication Technologies as tools essential to bolster the different programs of study of European university degrees has gained strength since the irruption of the COVID-19 pandemic. For practical purposes, this study, among other aspects, highlights the following strategies: a methodological transition through learning-service projects using ICT to counter their deficits of social technology; instrumentalization of social networks for academic purposes by raising the self-reported levels related to managing collaborative Internet tools; implementing immersive experiences through the metaverse [27] and gamification, as well as other 3D environments [19], to foment the ability to work with emerging technologies; promote an ethical and professional use following APA guidelines and author copyrights in student academic reports, online presentations, surveys, etc. Only in this way will it be possible to instill among future generations of teachers forming part of a society of information and knowledge a general awareness of cybersecurity, which is a key to moving towards an authentic professionalization of digital instruction [28].

REFERENCES (TRANSLATED AND TRANSLITERATED)

[1] M. J. Cuetos, L. Grijalbo, E. Argüeso, V. Escamilla, y R. Ballesteros, R., "Potentialities of the ICT and its role in fostering creativity: teachers' perceptions", *RIED-Iberoamerican Journal of Distance Education,* vol. 23, no. 2, pp. 287–306, 2020. doi: https://doi.org/10.5944/ried.23.2.26247 (in Spanish)

[2] P. Rudd, "School improvement through information and communications technology: limitations and possibilities", Teacher Development, vol. 5, no. 2, pp. 211-223, doi: https://doi.org/10.1080/13664530100200142 (in English)

[3] A. Ferrari, Digital Competence in practice: An Analysis of Frameworks, Luxembourg: Publications Office of the European Union, 2012. [Online]. Available: http://ftp.jrc.es/EURdoc/JRC68116.pdf (in English)

[4]   M. J. Latorre, A. García, y M. Bermúdez, "The research on teaching innovation through the ICTs", in ICT, teaching innovation and good practices: development of a training experience in educational centres, M. J. Latorre, M. Bermúdez, y A. García, Granada: Editorial Universidad de Granada, 2021, pp. 21-43 (in Spanish)

[5]   A. Gutiérrez, A. Palacios, y L. Torrego, "The training of future teachers and the integration of ICT in education: anatomy of a misunderstanding", *Journal of Education,* vol. 353, pp. 267-293, 2010. [Online]. Available: http://hdl.handle.net/11162/79374 (in Spanish)

[6]   M. P. Prendes, L. Castañeda, y I. Gutiérrez, "Competences for the use of ICT by future teachers", *To Communicate,* vol. 35, pp. 175-182, 2010. doi: doi: https://doi.org/10.3916/C35-2010-03-11 (in Spanish)

[7]   V. González, M. Román, y M. P. Prendes, "Digital skills training for university students based on the DigComp model", *Edutec. Electronic Journal of Educational Technology*, vol. 65, pp. 1-15, 2018. doi: doi: https://doi.org/10.21556/edutec.2018.65.1119 (in Spanish)

[8]   Z. Yan, "Differences in high school and college students' basic knowledge and perceived education of Internet safety: Do high school students really benefit from the Children's Internet Protection Act?", *Journal of Applied Developmental Psychology*, vol. 30, no. 3, pp. 209-217, 2009. doi: https://doi.org/10.1016/j.appdev.2008.10.007 (in English)

[9]   S. K. Shin, "Teaching critical, ethical, and safe use of ICT to teachers", *Language Learning & Technology,* vol. 19, no. 1, pp. 181–197, 2015. doi:http://dx.doi.org/10125/44408 (in English)

[10] E. De Waal, & M. Grösser, "On safety and security in education: Pedagogical needs and fundamental rights of learners", *Educar,* vol.50, no. 2, pp. 339-361, 2014. doi: https://doi.org/10.5565/rev/educar.44 (in English)

[11] C. Chou, & H. Peng, "Promoting awareness of Internet safety in Taiwan in-service teacher education: A ten-year experience", *The Internet and Higher Education*, vol. 14, no. 1, pp. 44-53, 2011. doi: doi: https://doi.org/10.1016/j.iheduc.2010.03.006 (in English)

[12] B. K. Engen, T. H. Giaever, & L. Mifsud, "Guidelines and regulations for teaching digital competence in schools and teacher education: A weak link?", *Nordic Journal of Digital Literacy*, vol. 10, pp. 172-186, 2015. doi: doi: https://doi.org/10.18261/ISSN1891-943X-2015-02-02 (in English)

[13] M. J. Gallego, N. Torres, y T. Pessoa, "Competence of future teachers in the area of digital security", *To Communicate*, vol. 61, pp. 57-67, 2019. https://doi.org/10.3916/C61-2019-05 (in Spanish)

[14] R. Gamito, P. Aristizabal, M. T. Vizcarra, y I. León, "Digital safety and childhood protection's: challenges for the 21st century school", *To Educate,* vol. 56, no. 1, pp. 219-237, 2020. doi: https://doi.org/10.5565/rev/educar.1113 (in Spanish)

[15] Coursera, Global skills index 2020. [Online]. Available: http://www.sertacdoganay.com/wp-content/uploads/Coursera-Global-Skills-Index-202 0.pdf (in English)

[16] L. Cohen, y L. Manion, L, Educational research methods, Madrid: La Muralla, 2002 (in Spanish)

[17] J. Meneses, The questionnaire, Barcelona: Universitat Oberta de Catalunya, 2016. [Online]. Available: https://femrecerca.cat/meneses/publication/cuestionario (in Spanish)

[18] M. Sabariego, A. Sánchez, y A. B. Cano, "Reflective thinking in Higher Education: contributions from narrative methodologies", *Complutense Journal of Education*, vol. 30, no. 3, pp. 813-830, 2019. doi: https://doi.org/10.5209/rced.59048 (in Spanish)

[19] F. Esteve, "Digital teaching competence: self-perception analysis and evaluation of the development of university education students through a 3D environment", Doctoral thesis, Universitat Rovira i Virgili, Tarragona, 2015. [Online]. Available: http://hdl.handle.net/10803/291441 (in Spanish)

[20] J. J. Gutiérrez, J. Cabero, y L. I. Estrada, "Design and validation of an instrument to assess the digital competence of university students", *Spaces Journal,* vol. 38, no. 10, 2017. [Online]. Available: https://www.revistaespacios.com/a17v38n10/17381018.html (in Spanish)

[21] J. Cabero, J. Barroso, J. J. Gutiérrez, y A. Palacios, "Validation of the digital competence questionnaire for future teachers through structural equations", *Bordon. Journal of Pedagogy*, vol. 72, no. 2, pp. 45–63, 2020. doi: https://doi.org/10.13042/Bordon.2020.73436 (in Spanish)

[22] INTEF, Instituto Nacional de Tecnologías Educativas y Formación del Profesorado, "Updating the Reference Framework for Digital Teaching Competence", Madrid, 2022. [Online]. Available: http://aprende.intef.es/mccdd (in Spanish)

[23] INTEF, Instituto Nacional de Tecnologías Educativas y Formación del Profesorado, "Common Framework for Teachers' Digital Competence", Madrid, 2017. [Online]. Available: http://blog.educalab.es/intef/2016/12/22/marco-comun-de-competencia-digital-docent e-2017-intef/ (in Spanish)

[24] M. P. Pérez, "Competences acquired by future teachers from initial teacher training", *Journal of Education,* vol. 347, pp. 343-367, 2008. [Online]. Available: http://hdl.handle.net/10481/46889 (in Spanish)

[25] R. Bisquerra, Introduction to statistics applied to educational research: a computational approach with the BMDP and SPSSX packages, Barcelona: Promociones Publicaciones Universitarias, 1987 (in Spanish)

[26] D. George, y P. Mallery, SPSS for Windows step by step: A simple guide and reference, Boston: Allyn and Bacon, 2003 (in English)

[27] J. López, S. Pozo, A. J. Moreno, y G. Lampropoulos, "Metaverse in Education: a systematic review", *Journal of Distance Education (RED)*, vol. 23, no. 73, 2023. [Online]. Available: https://revistas.um.es/red/article/view/511421 (in Spanish)

[28] J. Tejada, & K. V. Pozos, "New scenarios and digital teaching skills: Towards teacher professionalisation with ICT", *Teachers. Review of Curriculum and Teacher Training,* vol. 22, no. 1, pp. 41-67, 2018. [Online]. Available: https://recyt.fecyt.es/index.php/profesorado/article/view/63620 (in Spanish)

ЦИФРОВА БЕЗПЕКА В ОСВІТНІХ ПРОГРАМАХ: ДОСЛІДЖЕННЯ НА ОСНОВІ СПРИЙНЯТТЯ МАЙБУТНІХ УЧИТЕЛІВ

Марія Хосе Латорре-Медіна
доктор освітніх наук, доцент, кафедра викладання та організації школи,
Факультет освіти, економіки та технологій Сеути
Університет Гранади, Іспанія
ORCID ID 0000-0002-8185-2779
mjlator@ugr.es

Хайме Тнібар Харрус
учитель-практикант, здобувач ступеня вищої освіти (дошкільна освіта)
Факультет освіти, економіки та технологій Сеути в Університеті Гранади, Іспанія
chaimaetnibar@correo.ugr.es

Анотація. Ключовий аспект підготовки майбутніх учителів у період високого рівня цифровізації освіти вимагає надзвичайної уваги до цифрових навичок, особливо у сфері безпеки. Дослідження з цього питання проводилось за допомогою кількісного, теоретичного та систематичного огляду підготовки майбутніх учителів, які проходять навчання на факультеті освіти, економіки та технологій Сеути Університету Гранади (Іспанія). Основна мета дослідження полягає в тому, щоб визначити сприйняття майбутніми вчителями інструкцій, які вони отримують з цифрових питань, зокрема з кібербезпеки, на етапі їх підготовки до роботи. Для реалізації проєкту було застосовано описовий метод шляхом заповнення учасниками спеціально розробленої анкети під назвою "Компетентність у сфері цифрової безпеки, яка необхідна вчителям". Вивчення психометричних властивостей опитувальника показало його релевантність та надійність. Після застосування тестів описової та інференційної статистики автори мали на меті визначити, чи дійсно слухачі курсів підвищення кваліфікації відчувають себе компетентними в цифрових питаннях, чи вони відчувають потребу в додатковій теоретичній та практичній підготовці, особливо в галузі безпеки. Загальні висновки показують, що майбутні вчителі жіночої статі, які здобувають університетський ступінь за спеціальністю "Дошкільна освіта", хоча і є компетентними з техніко-педагогічної точки зору, вказують на те, що досягнення високого рівня компетентності в галузі цифрової безпеки вимагає більшої теоретичної та практичної підготовки. Майбутні вчителі початкової освіти чоловічої статі, навпаки, вважають себе компетентними в галузі цифрової безпеки. Можливо, це пов'язано з їх підготовкою (курси та семінари) з інформаційно-комунікаційних технологій (ІКТ), а також теоретичними та практичними інструкціями, які вони отримали в університеті на курсах або під час проходження практики. Цей аспект заслуговує на подальші дослідження, оскільки, як уже зазначалося, заклади вищої освіти повинні надавати пріоритет викладанню питань цифрової безпеки у своїх програмах підготовки вчителів.

Ключові слова: цифрова компетентність; цифрова безпека; захист даних; статистичний аналіз; підготовка вчителів.