DIGITAL TEACHERS IN DIGITAL SCHOOLS

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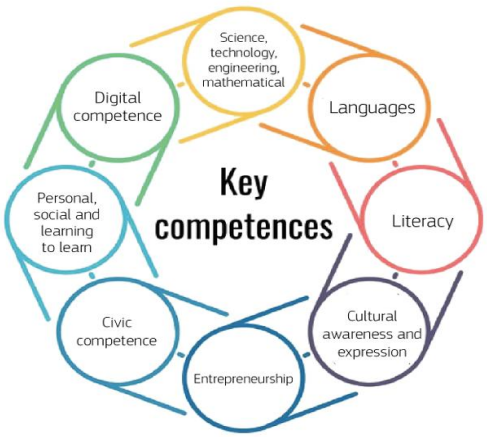
Abstract*: Anchoring education and school in society has always been an essential condition for the functioning and relationship between the two. Education has always had to take into account social requirements and adapt to changes. In a technological and digitalized society, there is need of people who are trained for this. As such, schools must also consider the development of digital competences. This study presents the results of a confirmatory research conducted among teachers regarding their training needs in the field of digital pedagogy, as well as a diagnosis of the level of development of teachers' digital competences, based on their self-assessment. The opinion questionnaire that we used was applied, through a Google form, to a number of 3305 teachers of various specializations, who teach in pre-university education schools in the counties of the S-W of Oltenia region. The results obtained after the application of the research tool allowed an analysis of the needs, so that a continuing professional development program in the field of digital pedagogy could be subsequently designed.*

Keywords*: Digital competences, New communication technologies, Digital pedagogy, DigCompEdu European framework.*

1. Introduction. Conceptual Delimitations

The use of new communication technologies has become inevitable in today's society, in any field of activity (Dubey, Tiwari, 2020; Levano-Francia, Sanchez Diaz, Guillén-Aparicio, 2019). Digital competence is included in the Framework of Key Competences for Lifelong Learning, as it can be seen in Figure 1.

Figure 1: Key competences



Source: Vuorikari, Kluzer, and Punie, 2022: 5

The pandemic period demonstrated that digital technologies are not only useful and necessary, but also indispensable (Perifanou, Economides, 2022).

Several phrases have been used in recent years to describe digital skills and competences. Bashkireva *et al*. (2020: 2) summarizes them: information and communication technology (ICT) skills; technological skills; information technology skills; 21st century skills; information literacy; digital literacy; digital competences.

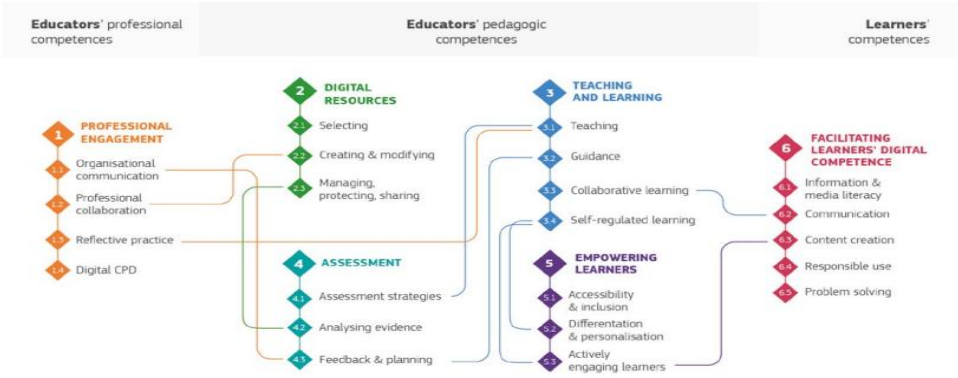
DigCompEdu defines the term "digital resource" as: "any content published in a computer-readable format" (Redecker, 2017, apud Heine, Krepf, König, 2023: 3715).

Digital competence is defined by some authors as "The ability to use digital technologies in a meaningful way for studying, working and for everyday life is called digital competence" (Katare, Saxena, 2018: 342). It represents "a modern concept that describes technology-related skills which include media and communication, information and communications technology (ICT) literacy, technology and computing, and information science" (Lapates, Flores, 2019: 15).

According to Ferrari (2012, apud Salas-Delgado, M.A. *et al.,* 2022: 1), digital competence represents "the skills, knowledge and attitudes that are required when Information and Communications Technology (ICT) and digital media are used to solve problems, manage information, create, and share content and build knowledge".

The most complex model regarding teachers' digital competences is the European framework (DigCompEdu), which offers a holistic framework regarding these competences. The complexity of this construct is reflected in the existence of several domains (areas) shown in figure no. 2.

Figure 2: DigCompEdu structure



Source: adapted from Palacios-Rodríguez *et al.*, , 2023: 116

According to Katare, D., Saxena, N. K. (2018: 343), we can differentiate two categories of digital competences: for everyday life and for professional activity, each having several levels of development, as it can be seen in table 1.

Table 1: Categories of digital competences

Category	Levels	Skills
Digital Skills for All	Adoption	Basic education and literacy; Familiarity with technology devices and services
	Basic Use	Basic understanding of technologies, software, and applications; Knowledge of digital privacy and security
Digital Skills for ICT Professionals	Creative use of Adaptations	Basic computing skills; Familiarity with basic algorithms
	Creation of New Technologies	Sophisticated programming skills; Knowledge of complex algorithms

Source: Katare, Saxena (2018: 343)

These competences contribute to the development of identity, thinking and decision-making skills and values (Milenkova, Keranova, Peicheva, 2020). According to Zaloga and Bryczek-Wróbel (2023), the higher the level of digital skills of the information society, the higher the awareness of threats and the effectiveness in counteracting cybercrime is, which translates into a higher level of social security.

Digital technology must be integrated into all areas of education, teacher training, educational infrastructure, methodology (pedagogy), educational resources and leadership management at all levels

and in all sectors of the education system (Morze, Vasylenko, Gladun, 2018, apud Morze, Smyrnova-Trybulska, Boiko, 2019: 366).

According to De la Calle, Pacheco-Costa, Gómez-Ruiz, Guzmán-Simón (2021), teachers' digital competence must be analyzed in the general context of social sustainability, digital competence being able to ensure access to the pressing issues and aspects of the current society, such as migration, gender equality, etc.

As a facilitator of the learning process, the teacher also supports the development of digital competences of the students and their colleagues (Inamorato dos Santos *et al*., 2023).

2. Research Design

The research we conducted aimed to conduct an investigate, among teachers who teach in pre-university education, the level of development of digital competences, as well as training needs in the field of digital pedagogy.

The hypotheses of this research were the following:

1. Knowing the level of development of teachers' digital competences allows shaping a continuing training program, which is able to ensure their development.

2. Identifying the thematic options of teachers facilitates the design of a training program curriculum, appropriate to their training needs.

The description of the research instrument

In order to carry out this analysis, we used a questionnaire-based survey, the instrument being applied through a Google Form. By applying the questionnaire, we aimed to establish the initial level of the teachers' digital competences. The questionnaire also took into account the knowledge of the teachers' training needs in terms of topics of scientific interest. All these aspects were presented in the form of two complex items, which included several sections and subsections. The item regarding the assessment of the level of digital competences was designed in accordance with the European framework of digital competences DigCompEdu, namely the six areas of competence. To assess the level, we used a four-step scale (Advanced, Medium, Basic, Do not have the competence), with respondents having the obligation to select for each competence, one of the mentioned options. The six areas of competence are as follows: 1. **Professional engagement, with the following competencies**: 1.1. Organizational communication; 1.2. Professional collaboration; 1.3. Reflective practices; 1.4. Continuous professional development, using digital technologies; 2. **Digital resources**, the subsumed competences being: 2.1. Selecting digital resources; 2.2. Creating and modifying digital resources; 2.3. Managing, protecting and sharing digital resources; 3. **Teaching and learning**, with the following competences: 3.1. Teaching; 3.2. Guidance; 3.3. Collaborative learning; 3.4. Self-regulated learning; 4. **Assessment**: 4.1. Assessment strategies; 4.2. Analysing evidence; 4.3. Feedback and planning; 5. **Empowering learners**, comprising the competencies: 5.1. Accessibility and inclusion; 5.2. Differentiation and personalization; 5.3. Actively engaging learners; 6. **Facilitating pre-schoolers'/preschoolers'/pupils'/students'/other learners' digital competence**: 6.1. Information and media literacy; 6.2. Digital communication and collaboration; 6.3. Digital content creation; 6.4. Responsible use; 6.5. Problem solving. The item regarding the topics that are in line with the training needs of the teachers included the six thematic areas, each including several topics.[1]

In order to record the opinions of the subjects, we used a scale also consisting of four steps: Not at all; To a small extent; To some extent; To a large extent. We are presenting here the six thematic areas: I. The role of the teachers' digital competences; II. Digital educational resources; III. Teaching, learning and assessment with digital technologies; IV. Digital technologies in education - an overview; V. The potential of technologies for active learning; VI. Digital pedagogy and the challenges of the near future.

Data collection procedure

The questionnaire was applied to all the subjects selected for the sample (3305), via Google Form.

The group of subjects consisted of 3305 teachers, of different specializations, coming from schools in both urban and rural areas, including schools located in disadvantaged areas, in the S-W of Oltenia region.

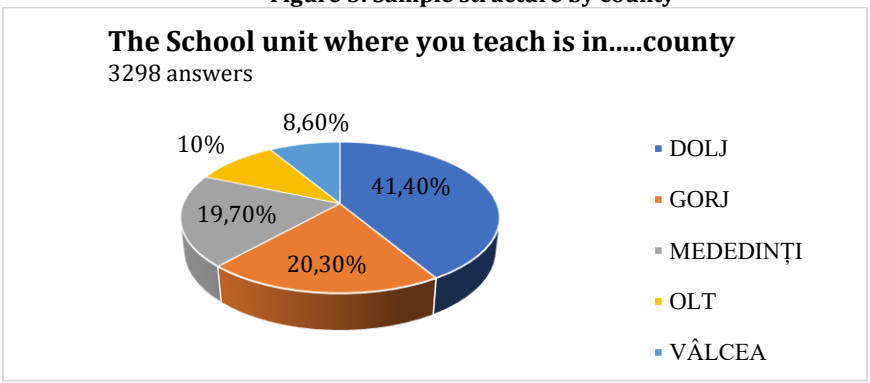
We should also mention that, although the number of respondents was 3305, it varies from one question to another, due to invalid answers.

[1] Recommended by *Pedagogie digitală pentru cadrele didactice din învățământul preuniversitar Ghidul solicitantului* (The Applicant Guide *Digital pedagogy for pre-university teachers*), 2024: https://www.edu.ro/sites/default/files/_fi%C8%99iere/Minister/2024/PNRR_24/Apel_Pedagogie_digitala/Lansare_apel/Ghid_solicitant_apel_PNRR_Pedagogie_digitala.pdf

We will now present the target group on which the questionnaire was applied.

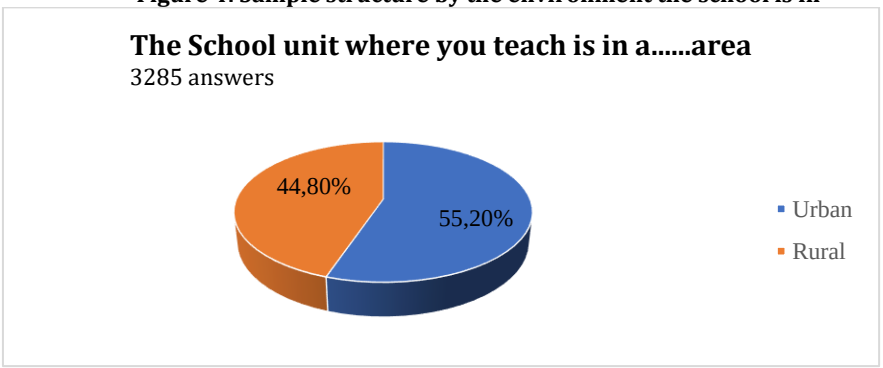
As for the distribution of the sample across the five counties where the questionnaire was applied, as shown in figure 3, over 40% were from Dolj county. Similar percentages are from Gorj (20.3%) and Mehedinți (19.7%) counties. 10% of the subjects are from Olt county, and 8.6% - from Vâlcea county. The difference in percentages is also given by the total number of teachers employed in pre-university education in each of the five counties, knowing that Dolj county clearly stands out from the other counties in this regard.

Figure 3: Sample structure by county



55.2% of the teachers teach in urban schools, and 44.8% - teach in rural schools (as shown in figure no. 4).

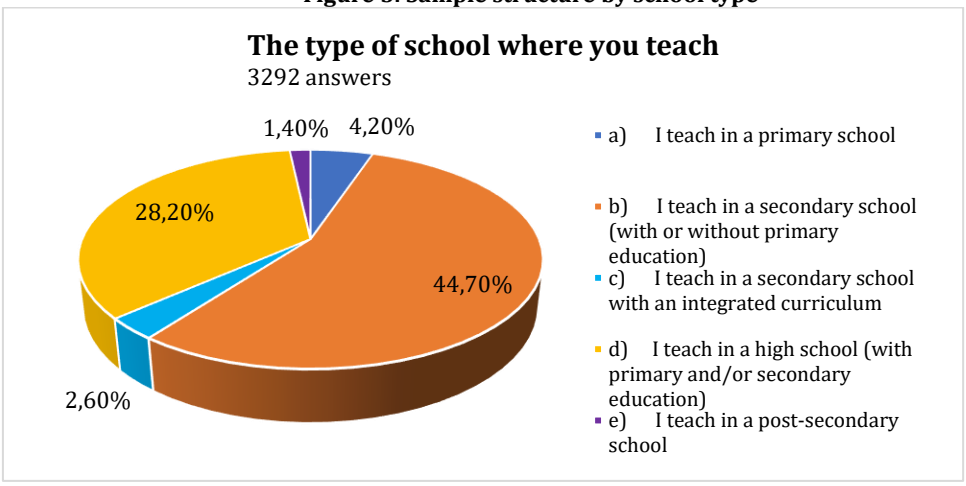
Figure 4: Sample structure by the environment the school is in



One of the questions in the questionnaire asked teachers to mention the type of school they teach in, choosing from the options provided or mentioning a different one, if applicable.

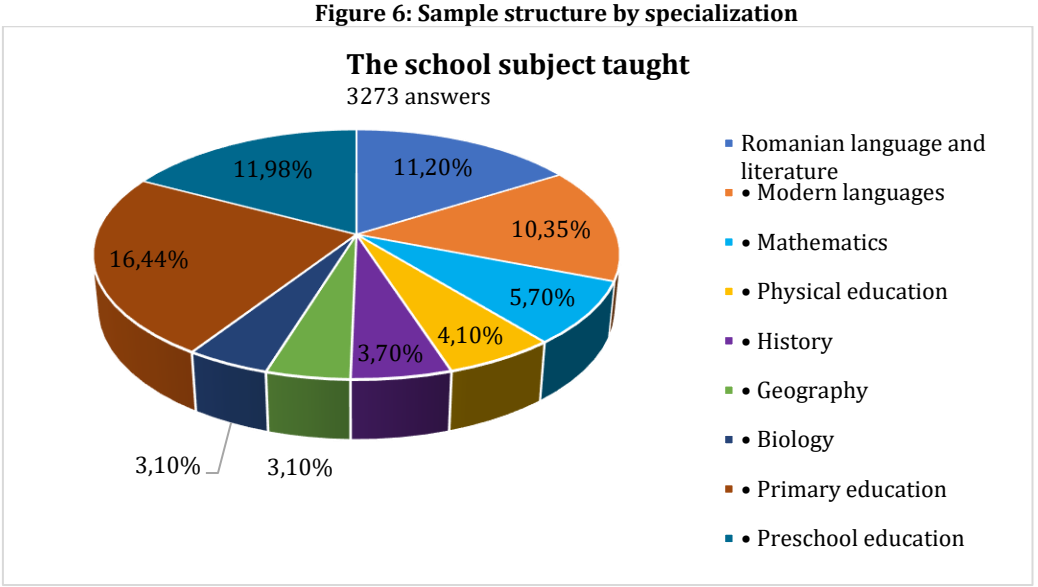
Figure 5 shows the teachers' options, expressed as percentages. We note that 3293 teachers responded to this item, and of these, 18.1% chose another option.

Figure 5: Sample structure by school type



Regarding the subject taught, the teachers' responses covered a wide range of options again. Figure 6 shows the most important percentages.

Figure 6: Sample structure by specialization



The majority of respondents (85.2%) were female, as it can be seen in figure 7.

Figure 7: Sample distribution by gender

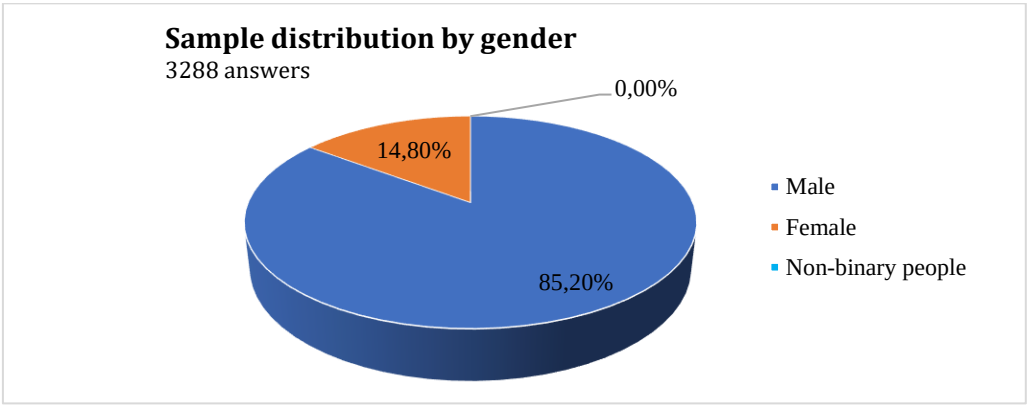
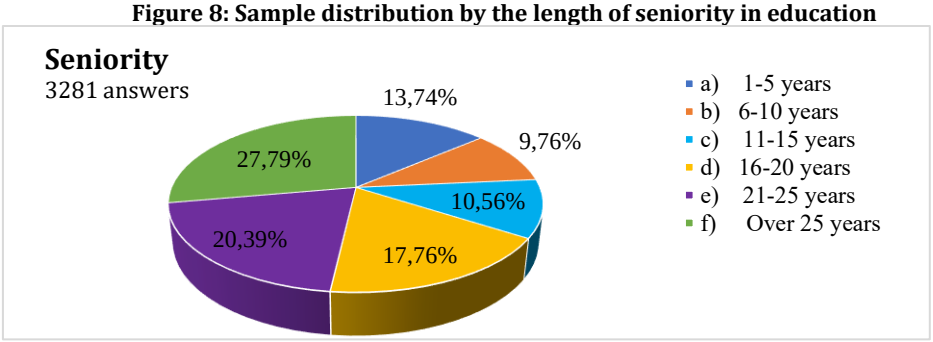


Figure 8: Sample distribution by the length of seniority in education



As it can be seen in figure 8, almost a third of the subjects have over 25 years of seniority. 20% of them have between 21-25 years, 17.76- between 16 and 20 years.

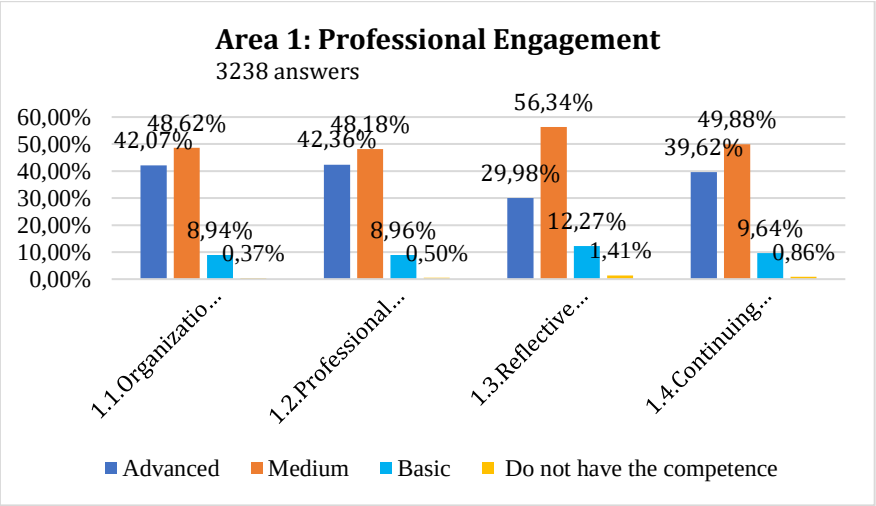
3. Results and discussions

As previously mentioned, the questionnaire included questions regarding the self-assessment of the digital competence level of development, in the six areas, according to the European framework and questions regarding the assessment of teachers' training needs, from the topics point of view in the field of digital pedagogy, which are of utmost interest[2].

[2]For this category of items, we referred to the thematic recommendations in the *Pedagogie digitală pentru cadrele didactice din învățământul preuniversitar Ghidul solicitantului* (The Applicant Guide *Digital pedagogy for pre-university teachers)*, 2024: https://www.edu.ro/sites/default/files/_fi%C8%99iere/Minister/2024/PNRR_24/Apel_Pedagogie_digitala/Lansare_apel/Ghid_solicitant_apel_PNRR_Pedagogie_digitala.pdf

We are first analyzing the teachers' responses to the first category of items.
Thus, for **Area 1: Professional Engagement**, the results are presented in Figure 9.

Figure 9: The subjects' opinion on their own level of digital competence development, corresponding to Area 1, according to DigCompEdu



As it can be seen, most of the teachers considered that they have an average or advanced level, for all four skills corresponding to Area 1. Competence 1.3. Reflective practices gathered the most responses for the option corresponding to the average level.

Regarding the competences included in Area 2. Digital resources, the results presented in figure 10 indicate the fact that teachers consider that they have an average level of development for each of them.

Figure 10: The subjects' opinion on their own level of digital competence development, corresponding to Area 2, according to DigCompEdu

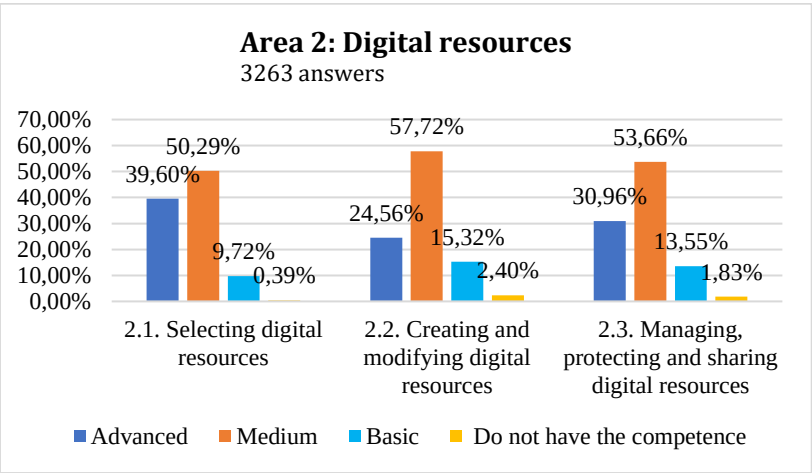
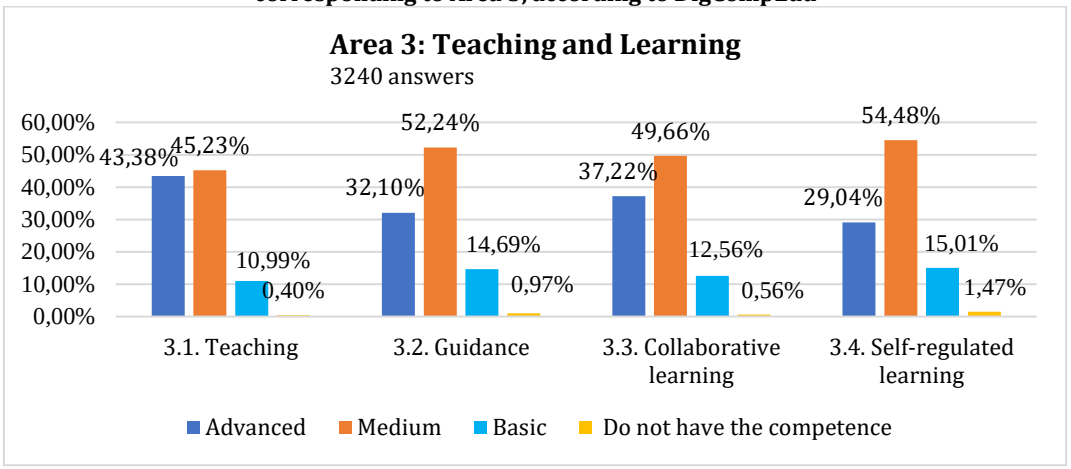


Figure 11 presents the results for the item regarding self-assessment of competences corresponding to area 3. Teaching and Learning.

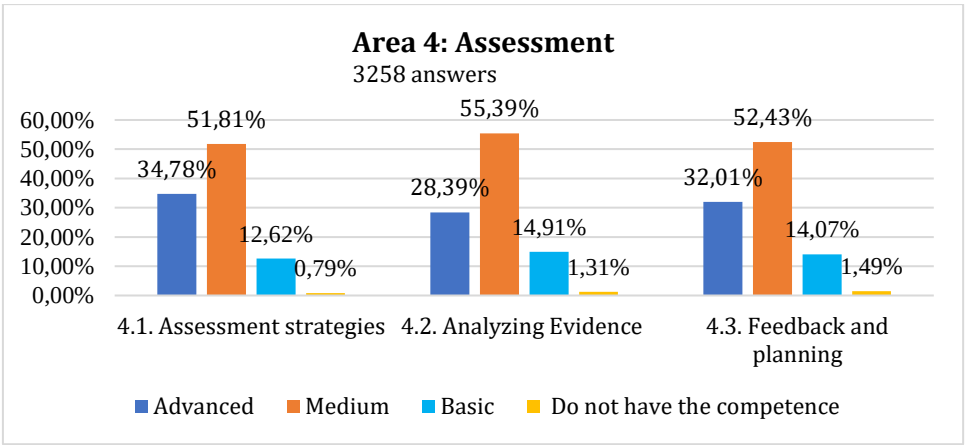
Figure 11: The subjects' opinion on their own level of digital competence development, corresponding to Area 3, according to DigCompEdu



Teachers' responses are also distributed primarily on the two previously mentioned options, the highest percentage for the average option being found in competence 3.4. Self-regulated learning.

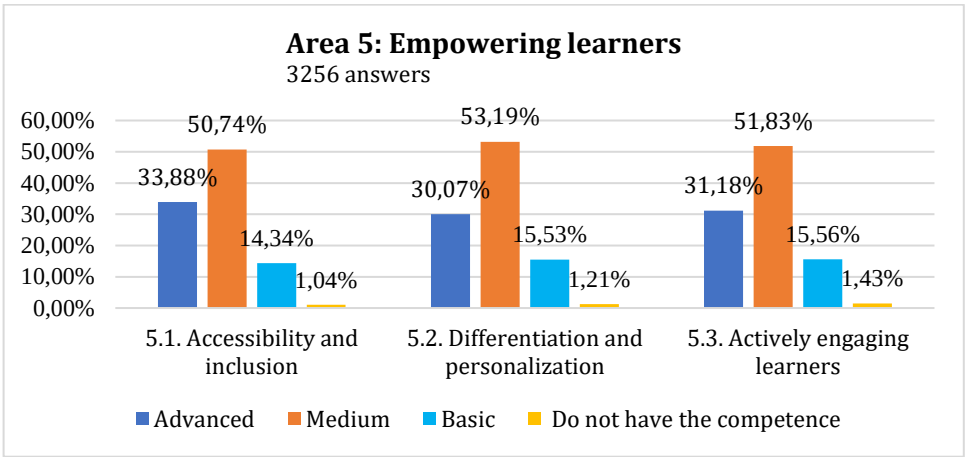
For Area 4. Assessment, for each of the three competences, over 50% - for competences 4.1. (Assessment strategies) and 4.3. (Feedback and planning), respectively, over 55% - for competence 4.2. (Evidence analysis) - of the surveyed teachers chose the option referring to the average level. A very small number of teachers (under 1% or between 1-2%) declared that they do not possess the competence.

Figure 12: The subjects' opinion on their own level of digital competence development, corresponding to area 4, according to DigCompEdu



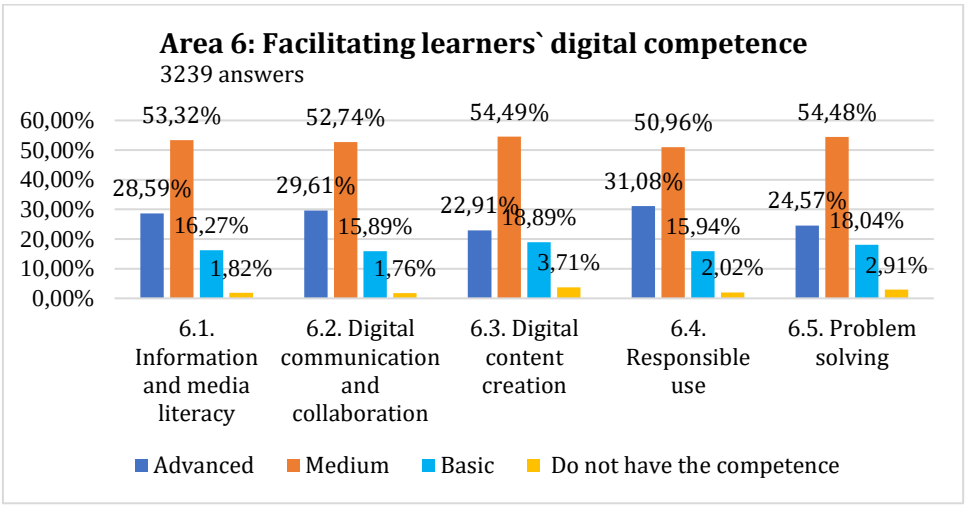
Approximately the same values were recorded after collecting the responses to the item regarding the self-assessment of competences that fall under Area 5. Student involvement. About one third of the respondents consider that they have an advanced level of development of each of the three competences, and over 50% consider that they have an average level. The number of those who have a basic level is around 14-15% (figure 13).

Figure 13: The subjects' opinion on their own level of digital competence development, corresponding to Area 5, according to DigCompEdu



Graph 14 presents the results of the item on self-assessment of competences for area 6 of competences, according to DigCompEdu.

Figure 14: The subjects' opinion on their own level of digital competence development, corresponding to Area 6, according to DigCompEdu

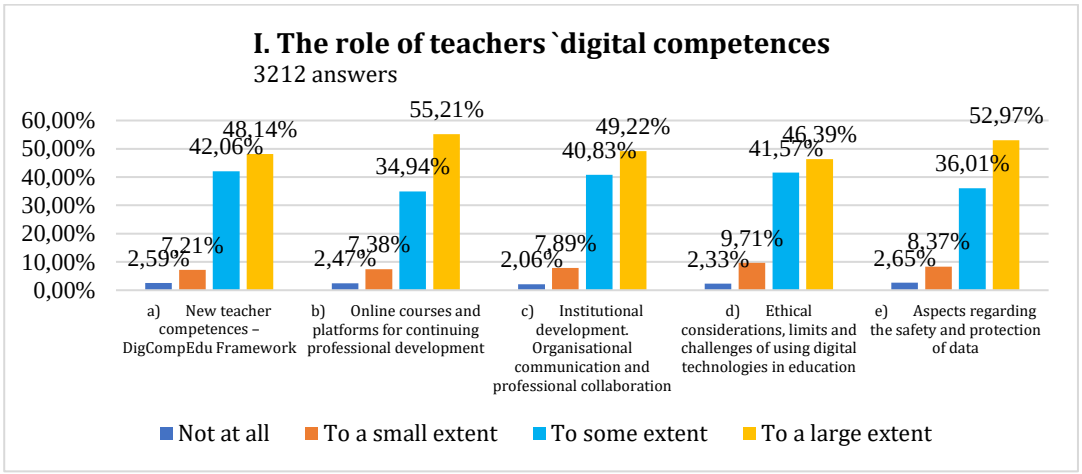


For each of the five competences in this domain, over 50% of the teachers assessed themselves as having an average level. Unlike the other domains, in this case, the number of teachers who declared that they did not possess the competence, increased (3.71% - for competence 6.3., 2.91% - for competence 6.5., respectively 2.02% - for 6.4.).

The second part of the questionnaire aimed to know the teachers' interest in the proposed topics in the field of digital pedagogy. We structured the topics into six thematic domains, corresponding to the 6 competence domains, according to DigCompEdu.

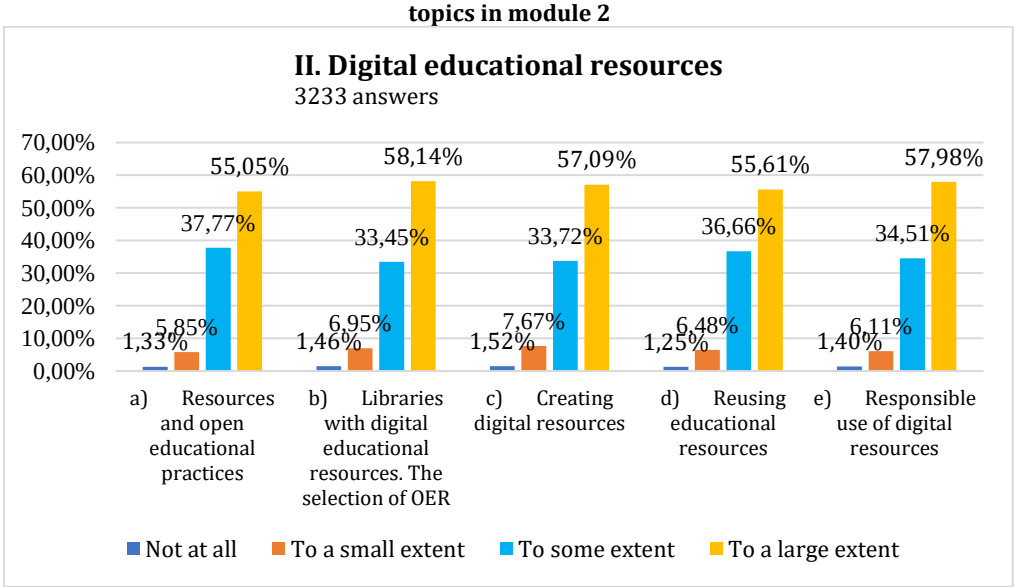
Thus, for the first thematic area, entitled The role of teachers' digital competences, almost half of the subjects surveyed declared that the sub-themes in this thematic structure are of great interest. Also, a significant percentage of the teachers declared that they are very interested in these topics (figure 15).

Figure 15: The subjects' opinion on the usefulness of digital competence development topics in module 1



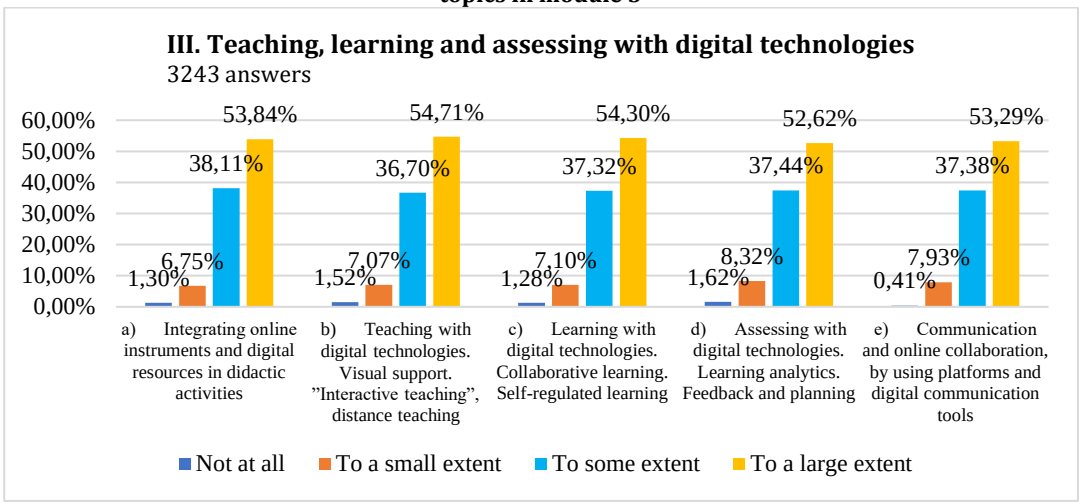
Thematic structure 2. Digital educational resources are of high interest among the surveyed teachers. For this item, the highest values were recorded for the "to a large extent" option (almost 60% for each of the topics in this module). The number of teachers who are not interested in the topics of this module is very small (around 1%) (figure 16).

Figure 16: The subjects' opinion on the usefulness of digital competence development topics in module 2



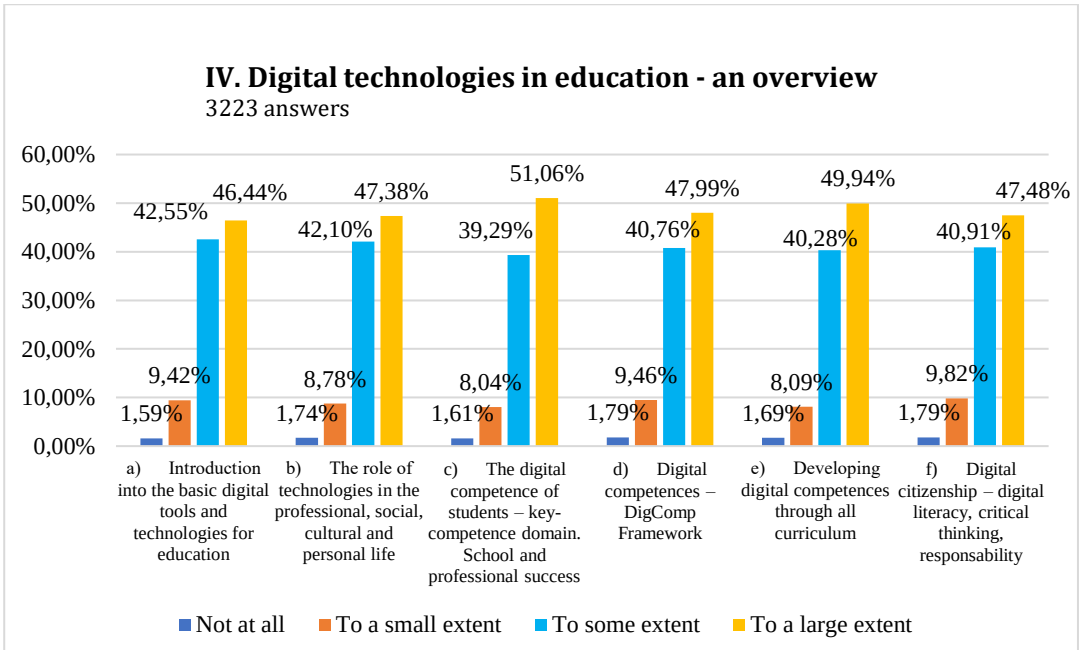
Approximately the same results were registered for the item related to module 3. Teaching, learning and assessing with digital technologies. For more than half of the teachers, all the topics of this module are of high interest. The integration of new digital technologies into fundamental teaching activities is an educational priority. The responses of the teachers who are not interested in these topics are very few (around 1%) (figure 17).

Graph 17: The subjects' opinion on the usefulness of digital competence development topics in module 3



The topics in module 4. Digital technologies in education – an overview were of less interest to teachers. Here, the answers were divided, mainly, into the options "to some extent" and "to a large extent". The predominantly theoretical nature of this module may be an explanation for the way the teachers' answers were distributed. However, for the integration of new digital technologies in education, it is very important and necessary to clarify the concepts and essential theoretical aspects regarding it. Thus, topics related to the introduction of new technologies in education, students' digital competence, teachers' competences, digital citizenship are meant to provide the necessary basis for the practical applications. We are presenting the results recorded for this item in figure 18.

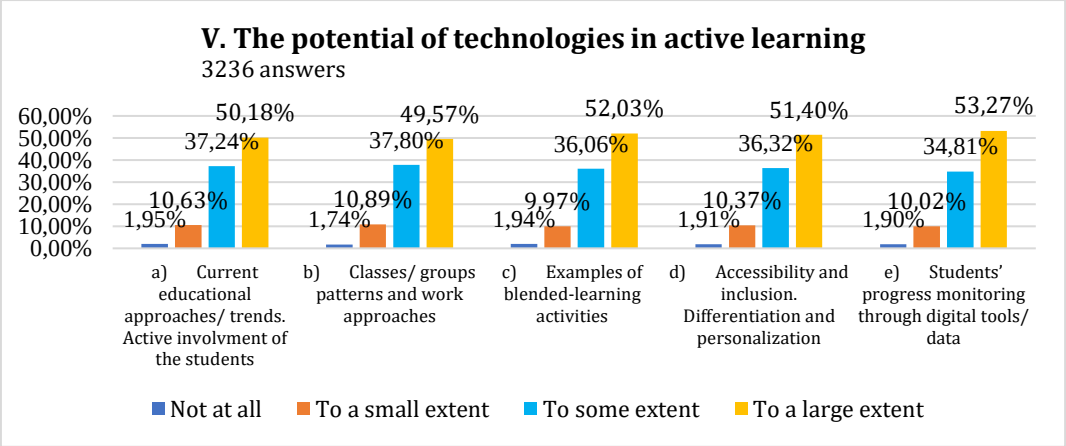
Figure18: The subjects' opinion on the usefulness of digital competence development topics in module 4



The topics in module V, The potential of technologies for active learning, are of interest to teachers, given that the concern for stimulating student activism has always represented a constant of the teacher's

activity, an always timely didactic principle. More than half of the subjects surveyed are very interested in these topics, as it can be seen in figure 19.

Figure 19: The subjects' opinion on the usefulness of digital competence development topics in module 5



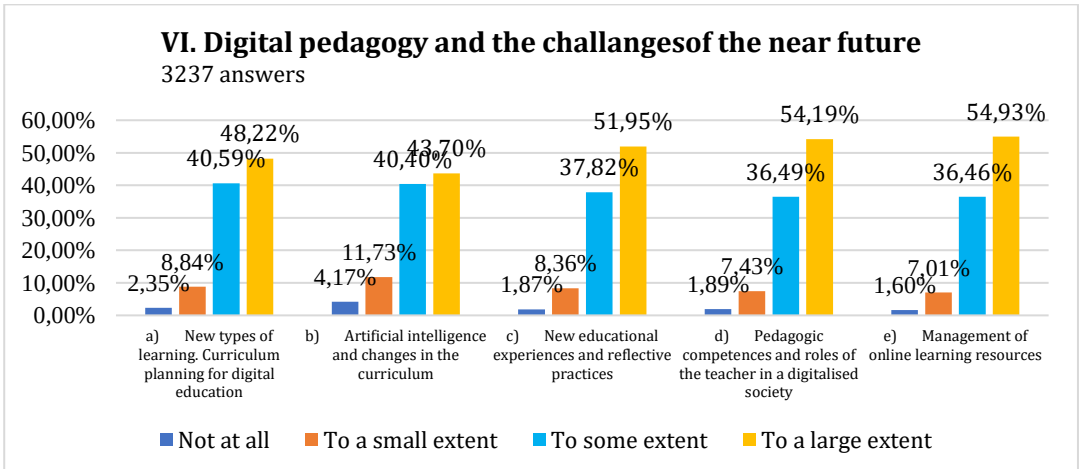
The teachers' responses to the last item of the questionnaire, which was about expressing their interest in the topics in module VI, Digital pedagogy and the challenges of the near future, fall within values similar to those recorded in the other items, completing a picture of the training needs of teachers, from the perspective of their thematic options.

A slight difference can be noted in the case of the topic related to artificial intelligence and changes in the curriculum. Although they recognize the importance and necessity of integrating new technologies in education, teachers are aware of the difficulty of reforming the curriculum from the perspective of artificial intelligence.

In contrast, the subjects surveyed are interested in the changes related to the new roles of the teacher in a digitalized society, this multiplication of roles representing an essential paradigm shift.

The results recorded for this item were centralized and are presented, in percentage form, in figure 20.

Figure 20. The subjects' opinion on the usefulness of digital competence development topics in module 6



4. Conclusions

The items of the questionnaire applied to the teachers participating in the constatative research pursued two essential variables: self-assessment of the level of development of teachers' digital competences; the inventory of the subjects' expectations and their curricular proposals, in order to design a professional development program. For the first of the variables, we referred to the digital competence framework of the professional educator - DigCompEdu, which organizes digital competences into six categories, and for the second variable, to the thematic recommendations in the Applicant's Guide *Digital Pedagogy for Teachers in Pre-university Education*, which also groups the topics into six categories, consistent with those of the DigCompEdu framework, so that the proposed topics ensure the development of all the skills provided for in the European framework.

Regarding the self-assessment of digital competences, most teachers declared that they had an average level for all the mentioned competences. Teachers showed a high interest in most of the proposed topics.

Following the proposals made by the subjects surveyed, through the questionnaire, we were able to synthesize the essential topics, which can constitute the curricular training offer, addressed to teachers in pre-university education.

The diagnostic research carried out also has a prognostic value, because it allowed the anticipation of possible directions of action in the field of continuous professional training of teachers.

References:

1. Katare, D., Saxena, N. K. (2018). Digital Competence: 21st Century Skill for Self-Development. In book: Employable Skill Development in New India – Benchmarks and Best Practices & Perspectives and Approaches. Publisher: Excel India Publishers. [online] available at: https://www.researchgate.net/publication/329738337_Digital_Competence_21st_Century_Skill_for_Self-Development#fullTextFileContent
2. Lapates, J.M., and Rozanne Tuesday G. Flores, R.T.G. (2019). Digital Competence Level: An Evaluation of Area Coordinators and Emergency Response(ACER) Team ICT Proficiency, *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, *2*(1), 15-19. [online] available at: DOI: 10.13140/RG.2.2.15898.08647
3. Morze, N., Smyrnova-Trybulska, E., Boiko, M., (2019) The Impact of Educational Trends on the Digital Competence of Students in Ukraine and Poland. In E.Smyrnova-Trybulska (Ed.) E-Learning and STEM Education, „E-Learning", 11, (pp. 365-379). Katowice-Cieszyn: Studio Noa for University of Silesia. [online] available at: http://doi.org/10.34916/el.2019.11.23
4. Dubey, R.S., Tiwari, V. (2020). Operationalisation of soft skill attributes and determining the existing gap in novice ICT professionals. *International Journal of Information Management, 50*, 375-386. [online] available at: https://doi.org/10.1016/j.ijinfomgt.2019.09.006
5. Milenkova, V., Keranova, D., Peicheva, D. (2020). Digital Skills and New Media and Information Literacy in the Conditions of Digitization. In: Karwowski, W., Ahram, T., Nazir, S. (eds) Advances in Human Factors in Training, Education, and Learning Sciences. AHFE 2019. Advances in Intelligent Systems and Computing, vol 963. Springer, Cham. [online] available at: https://doi.org/10.1007/978-3-030-20135-7_6
6. Heine, S., Krepf, M., König, J. (2023). Digital resources as an aspect of teacher professional digital competence: One term, diferent defnitions – a systematic review. *Education and Information Technologies, 28*, 3711–3738. [online] available at: https://doi.org/10.1007/s10639-022-11321-z
7. Bashkireva, T. *et al.* (2020). Problems of the formation of digital competence in the modern educational space. *Journal of Physics: Conference Series, 1691*, 012130, 1-5. [online] available at: doi:10.1088/1742-6596/1691/1/012130
8. De la Calle, A.M., Pacheco-Costa, A., Gómez-Ruiz, M.Á., Guzmán-Simón, F. Understanding Teacher Digital Competence in the Framework of Social Sustainability: A Systematic Review. *Sustainability, 13*, 13283, 1-17. [online] available at: https://doi.org/10.3390/ su132313283
9. Vuorikari, R., Kluzer, S. and Punie, Y. (2022). DigComp 2.2: The Digital Competence Framework for Citizens, EUR 31006 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-48882-8. [online] available at: doi:10.2760/115376, JRC128415
10. Zaloga, W., Bryczek-Wróbel, P. (2023). Digital competence of the information society in the aspect of social security. *Journal of Modern Science, 4*(53), 714-733. [online] available at: DOI: https://doi.org/10.13166/jms/177586

11. Inamorato dos Santos A. *et al.,* (2023). The digital competence of academics in higher education: is the glass half empty or half full? *International Journal of Educational Technology in Higher Education. 20*(9), 1-15. [online] available at: https://doi.org/10.1186/s41239-022-00376-0
12. Levano-Francia, L., Sanchez Diaz,S., Guillén-Aparicio, P. (2019). Digital Competences and Education. *Propósitos y Representaciones, 7*(2), 569 – 588. [online] available at: http://dx.doi.org/10.20511/pyr2019.v7n2.329
13. Salas-Delgado, M.A. *et al.* (2022). Digital Competence: Importance of Being Included in the Higher Education Curriculum. *CEUR Workshop Proceedings, 1*(3353), paper 7, 1-8. [online] available at: https://ceur-ws.org/Vol-3353/paper7.pdf
14. Perifanou, M., Economides, A.A. (2022). Digital Competencies for Online Teachers. Journal for Educators Online. [online] available at: DOI:10.9743/jeo.2022.19.3.13
15. Palacios-Rodríguez *et al.* (2023). Teacher Digital Competence in the education levels of Compulsory Education according to DigCompEdu: The impact of demographic predictors on its development. Interaction Design and Architecture(s) Journal, 57, 115 – 132. [online] available at: https://ixdea.org/wp-content/uploads/IxDEA_art/57/57_7.pdf
16. ***(2024). *Pedagogie digitală pentru cadrele didactice din învățământul preuniversitar Ghidul solicitantului.* [online] available at: https://www.edu.ro/sites/default/files/_fi%C8%99iere/Minister/2024/PNRR_24/Apel_Pedagogie_digitala/Lansare_apel/Ghid_solicitant_apel_PNRR_Pedagogie_digitala.pdf