DALMA LILLA DOMINEK, SZABOLCS CEGLÉDI, NÓRA BARNUCZ

The Study of Instructors' Digital Competence in Higher Education—Comparative Analysis

Studying the efficiency of information and communication technology (ICT) in education is a relevant issue today, as it is important to exploit the development of digital competence at all levels of education (Drent and Meelissen 2008). In this paper, the digital competence of teachers at the Ludovika University of Public Service (hereinafter: LUPS) (N=824) was investigated through the DigCompEdu self-assessment questionnaire. First, we hypothesized that, although teachers' digital competences may need to be improved, their motivation to use digital technologies in the classroom is positive. Second, we assume that independent variables (e.g., age, gender, having a doctoral degree) would affect the teachers' digital competences. According to the results, the majority of the teachers are open to integrating new ideas and methodological innovations in the classroom, willing to test new methods, and creative and critical in the use of different digital solutions.

Keywords: *information society, digital competence, higher education, methodological solutions*

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1. Introduction

Several national and international studies (Condie and Munro 2007; Buda 2020; Barnucz 2022) have examined how information and communication technology (ICT) tools can be used to implement educational reform. In the age of lifelong learning, information literacy is an essential ability for all information users, regardless of age. The importance of this has also been emphasized by Réka Racsko: "Without information and communication technology (ICT) literacy, we cannot be competitive in the 21st century labor market. We cannot meet the requirements of digital citizenship" (Racsko 2017, 43). Digital competence is one of the eight key competence areas created by the expert working group established by the Council of Europe in 2002 (Demeter 2006). These basic elements (key competencies) are part of all national core curricula of the European Union (Dringó-Horváth et al. 2020).

The rapid spread of the information society also raises the issue of digital inequality. Norris (2001) treated the issue as a multidimensional set of phenomena with global, social, and democratic dimensions. The present study focuses on the social dimension of the issue, which Norris (2001) defined as digital inequality within a given country or social group in terms of access, use, and competence. Furthermore, Norris (2001) found the social digital divide to develop along the following demographic indicators: income, education, age, ethnicity, and regional affiliation.

In our study, we examined the level of digital competence of the teachers at LUPS based on their own self-reported assessment, in addition to the digital divide that appeared to emerge among the listed socio-cultural factors, age, and other background variables, such as number of degrees or having a teacher qualification. Hargittai (2022) explained that, in relation to digital inequality, how users employ digital tools and content is of the utmost importance. The author is of the opinion that inequalities can be detected precisely in the differences in digital skills. To further describe this phenomenon, Hargittai (2022) coined the concept of the "second-level digital divide," which indicates that, while a user's age is negatively correlated with digital skills, solving tasks and searching for information on the Internet is viewed as an experience. However, the author's statement referring to age contradicts several studies (e.g., Török 2008; Hunya 2008; Buda 2010; Fehér and Hornyák 2010; Molnár 2010) that demonstrate that certain teachers have a higher level of digital competence than their students. According to Buda's (2017) digital generation theory, teachers are not digital immigrants but rather digital settlers, since they gladly and often use ICT tools. She stated that technological access alone is not enough to overcome digital inequality, as social differences also need to be considered (Hargittai 2002).

According to Horváth et al. (2020), in the development of students' digital competence, the task of the teacher (instructor) is to successfully navigate the digital space and to prepare for creative and safe activities. Furthermore, the development of key competencies through digital tools is in accordance with the expectations of the 21st century. Based on the above, the development of digital competence in higher education must be implemented on several levels, such as within the framework of IT education or through education integrated into specialized subjects (Dringó-Horváth et al. 2020). Teachers (instructors) can effectively support the digital competences of

their students if they can objectively assess and evaluate their own digital competences. After this self-examination, they can further develop their teaching methodology, making maximum use of the opportunities provided by ICT tools in the teaching-learning process (Botos, Botos and Barnucz 2023; Dominek et al. 2023). In addition to the individual responsibility of the teacher, systemic institutional support plays an equally decisive role in the development of digital competences (Dringó-Horváth et al. 2020). This approach includes training, curricula, and long-term strategic programs (European Commission 2018).

2. Theoretical background

2.1. Introducing the DigCompEdu framework

With the development of the information society and the emergence of technical and technological innovations, a constantly changing vision of the future is emerging. As such, the acquisition of knowledge must be adapted to meet the expectations of the accelerating information society, since lifelong learning and the development of competences are key to future survival. These expectations are particularly important in the education sector, since the training of future generations depends on their professional development and progress. In 2013, a new European framework for digital competence, the Digital Competence Framework for Citizens (hereinafter: DigComp), was developed in response to this rapidly and continuously changing environment. DigComp is the European reference framework for the interpretation and development of digital competence, thus providing a uniform interpretation of digital competences (Racsko 2017). The DigCompOrg (European Framework for Digitally Competent Educational Organizations) framework, which was created by the European Union in 2015 as a supplement to the DigComp framework, was specifically designed for educational organizations, emphasizing quality education with the help of digital technologies (Kampylis, Punie and Devine 2015). Further expansion of the existing DigComp framework was generated by technological and social changes, leading to the release of DigComp 2.0 in 2016 and version 2.1 in 2017. This latest framework includes a more detailed eight-level system supplemented with examples (Chira 2020). However, due to social peculiarities, it was not feasible to transfer the DigComp system to the Hungarian domestic environment (Racsko 2020). Therefore, the Infocommunications Uniform Reference Framework (IURF) was developed based on DigComp between 2015 and 2016. The system uniformly interprets digital skills, enabling the development of these skills along the same objectives (Racsko 2020) while providing an opportunity for users to determine their own level of digital competence. In 2017, considering the specifics of education, the European Commission developed the European framework for teachers' digital competence, DigCompEdu (Redecker 2017) (Figure 1). This framework was developed to determine the possibilities of using ICT technologies at all levels of education (Digital Pedagogical Developments Working Group 2019). The European framework "identifies the areas of digital competence that teachers and instructors need to develop in

order to effectively integrate digital technologies for educational purposes, and also makes it clear which areas are necessary for teachers to be able to adequately support students' digital development of competences" (Horváth et al. 2020, 7).

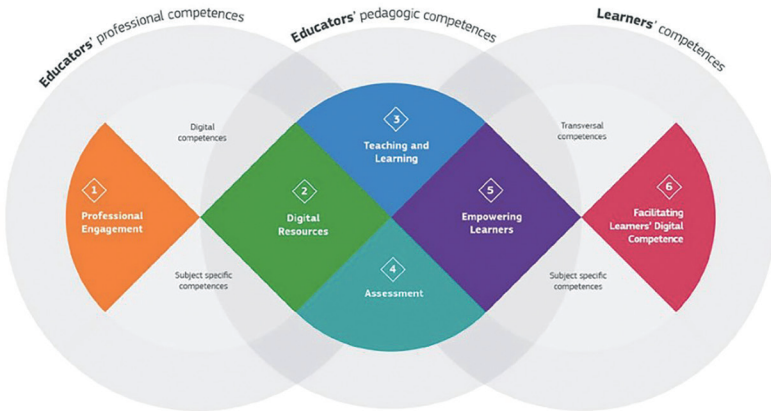

Figure 1: The main elements of teachers' digital competences based on the DigCompEdu competence areas (Digital Pedagogical Developments Working Group 2019, 1)

In Hungarian public education, the DigCompEdu framework was combined with digital competence expectations as defined in the Hungarian teacher qualification system (Digital Pedagogical Development Working Group 2019).

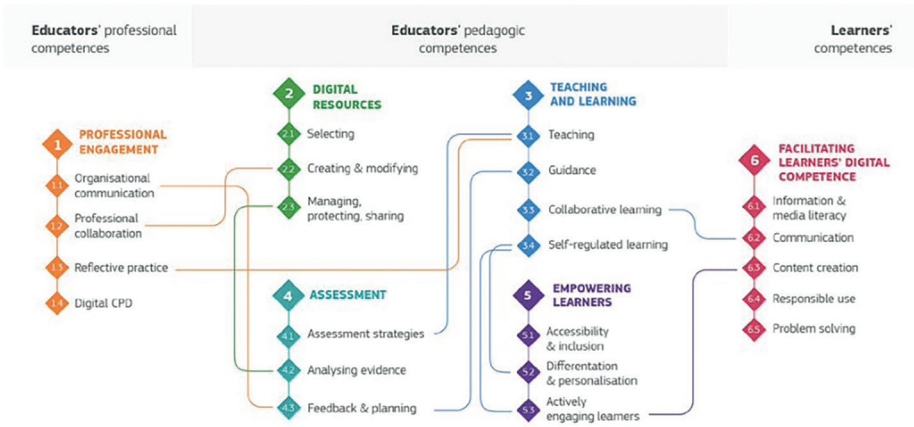

Figure 2: Subareas of the main competence areas based on the DigCompEdu framework (Digital Pedagogical Developments Working Group 2019, 2)

As a result, the DigCompEdu framework is defined by six competence areas (1. Professional Engagement; 2. Digital Resources; 3. Teaching and Learning; 4. Assessment; 5. Empowering Learners; and 6. Facilitating Learners' Digital Competence)[1], as well as 22 competence elements. Six different skill levels can be linked to these areas: A1 Newcomer, A2 Explorer, B1 Integrator, B2 Expert, C1 Leader, and C2 Pioneer. The sub-competences found within each competence area indicate an overlap between the individual competence areas, which is illustrated in Figure 2.

3. Empirical research

3.1. Presentation of the measurement tool

The research examines the digital competence of LUPS teachers within the framework of the tender program TKP2021-NKTA-51. The research consists of two interdependent stages: quantitative research (questionnaire) and qualitative research (focus group research for deep drilling). The data collection was carried out from December 2021 until February 2022. All teachers at the university received the online questionnaire (N=824 people), and 355 people completed the questionnaire. The data were coded and analyzed using SPSS. For this study, we used the version of the DigCompEdu questionnaire prepared by the Joint Research Centre of the European Commission and adapted for higher education by Horváth et al. (2020). We carried out an examination of the validity and reliability of the questionnaire; the data of the statistical procedures and the fit indicators were in the good or acceptable range. To establish the convergent validity of the measuring instrument, McDonald's omega value was used, where the heuristic threshold value of 0.7 was used as a basis. Therefore, a value above 0.7 was considered acceptable for the reliability index. According to the results, most of the scales have adequate internal consistency indicators, except for the "search for digital resources" area. However, as omitting the items of the mentioned area (3 items) does not increase the omega values, we did not consider it appropriate to delete them. The four dimensions of the self-rating questionnaire included a total of 45 questions. The four dimensions are: (1) background data; (2) IT data; (3) assessment of digital competence through the six competence areas of DigCompEdu; and (4) the question block about institutional support.

3.2. Presentation of the research, research questions, hypotheses

The purpose of the research is, firstly, to explore the relationship between teachers and the use of digital solutions in the classroom, as well as the teachers' development needs for digital competence. Furthermore, we aim to highlight the role of introducing experience-based digital training and methodology in furthering the

1 Instead of the original titles of the six competences, we use the following abbreviations in the statistical tables: comp1, comp2, comp3, comp4, comp 5, comp6.

aims of this research. During the study, we examined the level of digital competence the teachers at LUPS had according to their self-assessment, the factors that most influenced their level of digital competence, as well as their strongest and weakest areas of competence. According to our first hypothesis, the teachers' level of digital competence requires development, but their motivation showed a positive direction regarding the use of digital technologies in the classroom. In addition, we assume that significant differences can be statistically demonstrated between the average score on the competence areas and the independent variables, such as teacher qualification, gender, age, number of diplomas, having a doctoral degree, and average score on competence areas.

3.3. Characteristics of respondents

The majority of the respondents were men (65.1%), while 34,9% of the respondents were women of the respondents. Given the characteristics of LUPS, this ratio is representative of the current makeup of the faculty. Based on the age distribution, the age groups of 36–45 (sample: 31,10%; basic population: 30,49%) and 46–55 (sample: 31,69%; basic population: 30,25%) were represented in the largest proportion. The proportion of teachers in the older age groups is also significant, while the proportion of early career teachers aged 25–35 is negligible in the sample. According to the years spent teaching in higher education, there were smaller differences in the group sizes than for the age groups. However, it is important to note that 26.7% of teachers have been teaching for more than 20 years. In relation to age and the digital divide, we looked at the correlation between age and the digital skills score. Although no significant correlation could be detected between the two variables, the correlation was negative, displaying that the proficiency level of digital competence decreases with advancing age (Tódor 2022). It is interesting that two-thirds of the respondents do not have a teacher qualification. Concerning the number of degrees, among the instructors at LUPS, the highest proportion is made up of two-degree holders (42.2%).

3.4. The primary empirical results

The evaluation based on the self-classification of the Common European Reference Framework is illustrated using a cross table based on Horváth et al. (2020), which estimates the assessment of an individual's competence level by including two variables. Table 1 shows how the respondents felt about their own level of digital competence. The questionnaire asks the respondents to evaluate their own competence twice, at the beginning and the end of the assessment. The main idea behind this is to assess to what extent the respondents' self-evaluation changed after answering the questions. In the table, the percentage of those who rated themselves the same at the beginning and the end was marked in dark gray (diagonal area of the table). In the cases marked with the lightest gray color, the respondents judged their own

competence level more negatively at the end of the questionnaire (cells below the diagonal), while the darker gray color represents the opposite (cells above the diagonal).

Self-assessment of the level of digital competence		**After completing the questionnaire**					
Before completing the questionnaire	**A1**	**A1**	**A2**	**B1**	**B2**	**C1**	**C2**
	A2	0.7	1.0	0.0	0.0	0.0	0.0
	B1	0.7	9.5	1.3	0.7	0.0	0.0
	B2	0.0	4.9	14.1	3.3	0.0	0.0
	C1	0.3	2.3	9.5	33.9	2.6	0.0
	C2	0.0	0.0	0.3	3.3	4.9	0.3
	A1	0.0	0.0	0.7	1.0	1.0	3.6

Table 1: Self-classification of the competence of the respondents before and after completing the questionnaire (Source: TKP2021-NKTA-51; n=355 own editing, based on Horváth et al. 2020, 14)

Overall, 8.9% of the instructors improved their self-rating at the end of the questionnaire, while 24% decreased their ratings. 42.1% of LUPS teachers classified their competence level as B2 (expert), but a significant proportion also rated themselves in accordance with the B1 (integrator) level. The two extreme options, on the other hand, were chosen in an extremely low proportion (Figure 3).

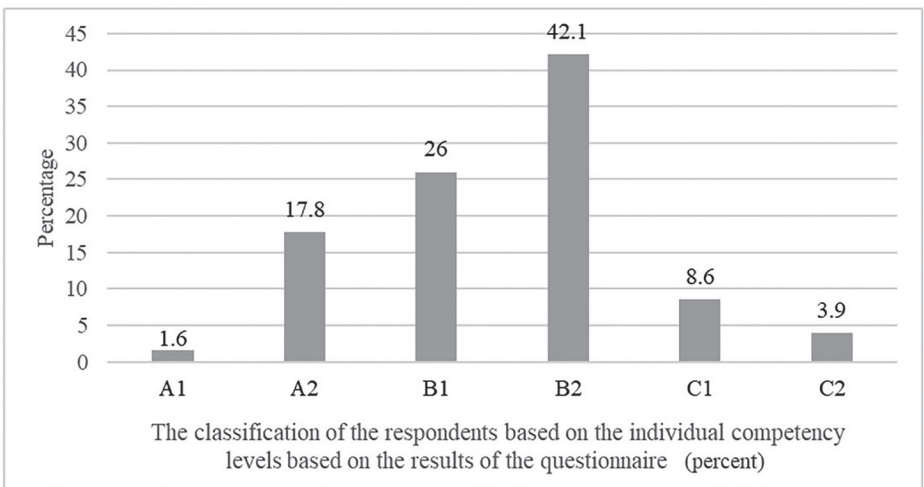

Figure 3: Self-classification of LUPS teachers (Source: TKP2021-NKTA-51; n=355, own editing, based on Horváth et al. 2020, 15)

Figure 4 illustrates the correlation between the six factor areas and the regression weight of the related sub-questions. According to our results, the strength of the correlation relationship between the factors is considered to be medium. Although the majority of the regression relationships can be classified as weak, they reached a medium strength in certain cases, especially in relation to the digital resources management factor.

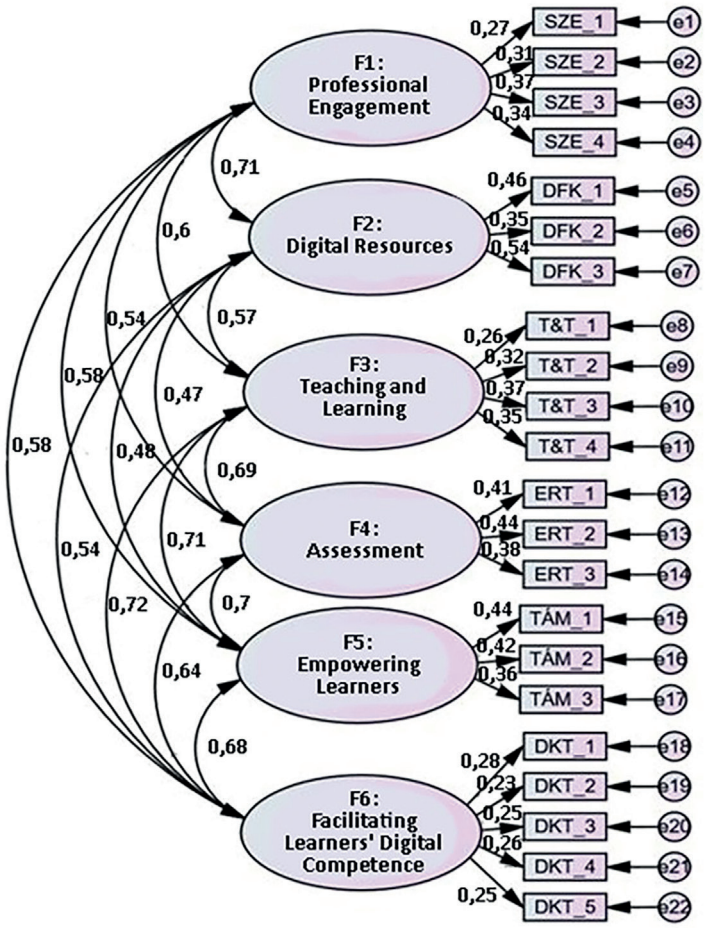

Figure 4: Factor structure of DigCompEdu (Source: TKP2021-NKTA-51; n=355, own editing, based on Horváth et al. 2020, 11)

The bar charts marked in Figure 5 illustrate the ratio of the average scores of the respondents in each of the six competence areas. Based on the data, the teachers mostly achieved the highest score (63.00%) in Digital Resources (comp2), while the lowest (52.14%) was in Assessment (comp4).

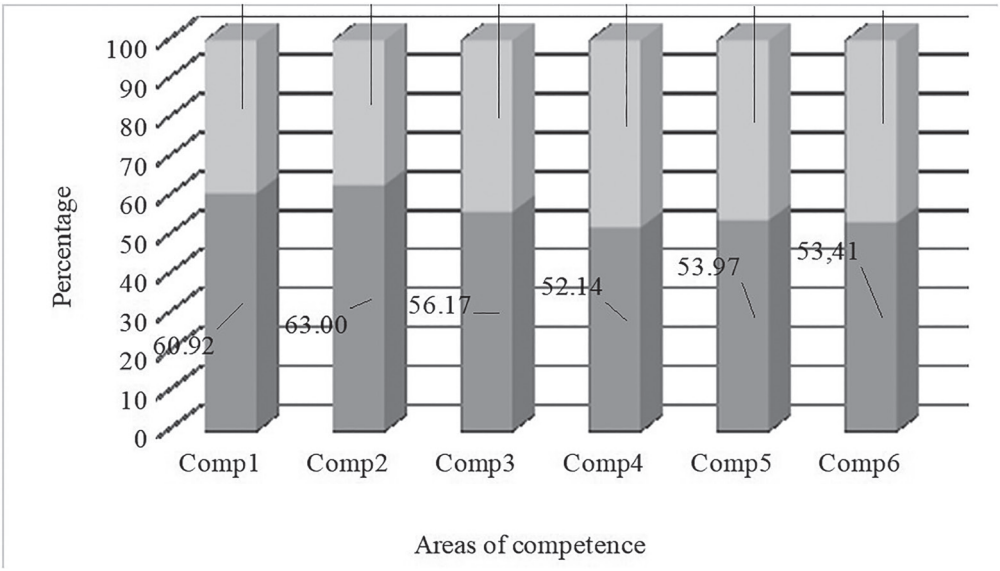

Figure 5: The percentage of scores achieved by the respondents in each area (Source: TKP2021-NKTA-51; n=355, own editing, based on Horváth et al. 2020, 16)

Differences by different aspects in the six areas of competence

Average points achieved by competence areas involving faculties

The average scores in each of the six competence areas illustrate which subgroups performed better in each area. However, it is important to bear in mind that, when presenting quantitative data, if there is no significant difference between two variables, it is equivalent to a research result as if there had been a difference. This finding can be applied to the four faculties[2] of the University of Public Service, as there is no difference in the six competence areas. In other words, belonging to any specific faculty does not make it more likely that an individual will perform better on any of the competences. As shown in Table 2, the average scores are the same or close to the same for all faculties. The standard deviations are minimal and do not lead to significant differences. Furthermore, it is worth noting that age also does not have a significant effect on the presence of competences. Thus, the younger groups in our sample are not shown to be more comfortable with digital tools than the older groups.

[2] 1. Faculty of Public Governance and International Studies (FPDIS); 2. Faculty of Military Sciences and Officer Training (FMSOT); 3. Faculty of Law Enforcement (FLE), 4. Faculty of Water Sciences (FWS).

Faculties of UPS		Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
FPDIS	Mean	12.2043	9.7527	11.5495	8.1111	8.3182	13.5455
FMSOT	Mean	12.1379	9.3908	11.1341	7.5325	7.9259	12.7778
FLE	Mean	12.3131	9.5253	11.0816	7.7872	8.2083	13.6667
FWS	Mean	11.9268	8.7073	11.1000	7.8718	7.6750	13.3333

Table 2: Connection between academic degrees and average scores on competence areas. Source: TKP2021-NKTA-51; n=355

In the following step, we used non-parametric ANOVA to compare having a doctoral degree and the scores of the competences. Our results confirm that having a doctoral degree is a significant competitive advantage, and that these relationships can be generalized for the six categories of digital competences (Table 3). It was evaluated with the Dunn-Bonferroni Test, which compares the differences by pairs. The relevant categories are: Professional Engagement (comp1), Digital Resources (comp2), Teaching and Learning (comp3), Assessment (comp4) and Empowering Learners (comp5) (Tables 4–8). This means that having a doctoral degree is clearly a determining factor in achieving a higher score on the test.

Variables	Significance
Comp1 – doctoral degree	**0.006**
Comp2 – doctoral degree	**0.003**
Comp3 – doctoral degree	**0.008**
Comp4 – doctoral degree	**0.007**
Comp5 – doctoral degree	**0.003**
Comp6 – doctoral degree	**0.008**

Table 3: Significance of having a doctoral degree on competence areas. Source: TKP2021-NKTA-51; n=355; Kruskal-Wallis Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

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Doctoral Degree	Test Statistic	Adjusted Significance
Yes – No	32.308	0.056
No – I am a doctoral student.	-50.877	**0.004**
Yes – I am a doctoral student.	-18.568	0.420

Table 4: The comparison of having an academic degree and Professional Engagement (comp1). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Doctoral Degree	Test Statistic	Adjusted Significance
Yes – No	40.735	**0.009**
No – I am a doctoral student.	-51.963	**0.003**
Yes – I am a doctoral student.	-11.228	1.000

Table 5: The comparison of having an academic degree and Digital Resource (comp2). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Doctoral Degree	Test Statistic	Adjusted Significance
Yes – No	40.510	**0.009**
No – I am a doctoral student.	-42.143	**0.023**
Yes – I am a doctoral student.	-1.633	1.000

Table 6: The comparison of having an academic degree and Teaching & Learning (comp3). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Doctoral Degree	Test Statistic	Adjusted Significance
Yes – No	23.660	0.195
No – I am a doctoral student.	-47.596	**0.005**
Yes – I am a doctoral student.	-23.936	0.142

Table 7: The comparison of having an academic degree and Assessment (comp4). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Doctoral Degree	Test Statistic	Adjusted Significance
Yes – No	34.772	**0.029**
No – I am a doctoral student.	-53.221	**0.002**
Yes – I am a doctoral student.	-18.449	0.389

Table 8: The comparison of having an academic degree and Empowering Learners (comp5). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

In another statistical procedure (Mann-Whitney U Test), we studied the connection between teacher qualifications and average scores on competence areas. The results below show that having a teacher qualification has no effect on performance in different competence areas. An exception is the category of Empowering Learners (comp5), where the presence of a teacher qualification is likely to lead to

significantly higher levels of support (Tables 9–10) (p=0.025); despite previous perceptions, the existence of a teacher qualification is essentially irrelevant to the quality of the use of digital methods in the classroom.

Competences	Teaching qualification	N	Mean Rank	Sum of Ranks
Comp 1	Yes	113	159.22	17992.00
Comp 2	Yes	113	151.55	17125.50
Comp 3	Yes	109	165.94	18087.00
Comp 4	Yes	102	150.88	15389.50
Comp 5	Yes	108	**168.19**	18165.00
Comp 6	Yes	107	161.41	17270.50

Table 9: The comparison of having a teacher qualification and the average score on competence areas. Source: TKP2021-NKTA-51; n=355; Note: ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

	Comp1	Comp2	Comp3	Comp4	Comp5	Comp6
Mann-Whitney U Test	11551.000	10684.500	9926.000	9141.500	8997.000	9586.500
Asymp. Sig. (2-tailed)	0.854	0.198	0.151	0.462	**0.025**	**0.192**

Table 10: Significance of teaching qualification on competence areas. Source: TKP2021-NKTA-51; n=355; Mann-Whitney U Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Connection between gender and average scores on competence areas

The Mann-Whitney U test was applied to test the average differences between gender and the average scores on competence areas. While the average scores for the six categories do not significantly differ by gender in most cases, men perform significantly better than women in Facilitating Learners' Digital Competences (comp6—p=0.019) (Tables 11–12). This means that, in general, members of one gender are not considered to be better than the other in the competence areas.

	Gender	N	Mean Rank	Sum of Ranks
Comp 1	Male	208	164.92	34303.00
	Female	112	152.29	17057.00
Comp 2	Male	208	165.82	34490.00
	Female	112	150.63	16870.00

Comp 3	Male	203	163.17	33122.50
	Female	108	142.53	15393.50
Comp 4	Male	190	149.06	28321.50
	Female	101	140.24	14164.50
Comp 5	Male	198	155.34	30758.00
	Female	107	148.66	15907.00
Comp 6	Male	197	161.17	31750.00
	Female	107	136.54	14610.00

Table 11: The comparison of gender and average scores on competence areas. Source: TKP2021-NKTA-51; n=355

	Comp1	**Comp2**	**Comp3**	**Comp4**	**Comp5**	**Comp6**
Mann-Whitney U	10729.000	10542.000	9507.500	9013.500	10129.000	8832.000
Asymp. Sig. (2-tailed)	0.242	0.158	0.053	0.389	0.524	**0.019**

Table 12: Significance of gender on competence areas. Source: TKP2021-NKTA-51; n=355; Mann-Whitney U Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

Connection between the number of diplomas and average scores on competence areas

The Kruskal-Wallis and Dunn-Bonferroni Tests were used to compare the differences between the number of diplomas and the average scores on competence areas. Our analysis confirms that, in several cases, the number of diplomas is correlated with the average scores in the competence areas. This is supported by significant results in the areas of Teaching and Learning (comp3 – p=0-000); Empowering Learners (comp5—p=0.009); and Facilitating Students' Digital Competences (comp6—p=0.001) (Table 13). This means that, in many cases, people with more diplomas are more likely to score better on the test.

Variables	**Significance**
Comp1 – the number of diplomas	0.429
Comp2 – the number of diplomas	0.604
Comp3 – the number of diplomas	**0.000**

Comp4 – the number of diplomas	0.074
Comp5 – the number of diplomas	**0.009**
Comp6 – the number of diplomas	**0.001**

Table 13: Significance of the number of diplomas on competence areas. Source: TKP2021-NKTA-51; n=355; Kruskal-Wallis Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

In the area of Teaching and Learning (comp3), it was confirmed that those with three diplomas scored better than those with one or two diplomas (Table 14). A similar correlation was found in the area of Empowering Learners, where those with three diplomas also scored better than those with one diploma (Table 15). Furthermore, in the area of Facilitating Students' Digital Competences (comp6), participants with three diplomas scored higher than those with less than one (Table 16). Therefore, the above suggests that, in many cases, those with more diplomas are better able to use digital tools to support lessons. However, our results suggest that, above three diplomas, there is no significant effect of the number of diplomas on the scores achieved.

The number of diplomas	**Test Statistic**	**Adjusted Significance**
1-3	-62.285	0.000
2-3	-48.462	0.004

Table 14: The comparison of the number of diplomas and Teaching & Learning (comp3). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

The number of diplomas	**Test Statistic**	**Adjusted Significance**
1-3	-45.227	0.025

Table 15: The comparison of the number of diplomas and Empowering Learners (comp5). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

The number of diplomas	**Test Statistic**	**Adjusted Significance**
1-3	-59.441	0.001
2-3	-39.435	0.035

Table 16: The comparison of the number of diplomas and Facilitating Learners' Digital Competence (comp6). Source: TKP2021-NKTA-51; n=355; Dunn-Bonferroni Test ***: P ≤ 0.001, **: P ≤ 0.01, *: P ≤0.05

4. Summary

The first step of the research was to map the level of digital competence of the teachers at LUPS. With reference to the present sample, it can be said that the participants evaluated their own digital competence at the B1–B2 level on average. In terms of the level of digital competence, inequalities can be detected; this is also displayed by the examined teachers mostly being able to utilize the benefits of ICT tools to manage digital content, while the area of evaluation showed a need for improvement. The scores achieved in the other areas indicated the teachers' openness to digital technology-based education, which could be positively influenced by university training offers to reduce digital inequalities (Tódor 2022). The first hypothesis—that although the digital competence of the teachers at LUPS requires development, their motivation shows a positive direction in terms of their use of digital technologies in the classroom—was confirmed. Many of the teachers rated themselves at the B2 level, which implies that they enjoy using ICT tools in their work; use many digital technologies confidently, creatively, and critically; choose applications appropriately; and are curious and open to new ideas (Redecker 2017; Dominek and Barnucz 2022). Second, the hypothesis that the independent variables (age, gender, having an academic degree, teacher qualification, etc.) would affect the teachers' digital competence was confirmed. The results indicated that the number of diplomas and having a doctoral degree can play a major role in digital competences, while gender and teacher qualifications have no significant effect. In addition, the proficiency level of digital competence was found to decrease with advancing age.

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