Could digital competence be one of the most important key competencies of the future?

The study examines the development of digital competence among first-year students of Ludovika National University of Public Service. In response to the growing demands of the labor market and public service, the university introduced a compulsory course aligned with the DigComp 2.1 framework. The training aimed to develop five key areas: information and data management, communication and collaboration, digital content creation, security, and problem solving. The research measured student progress across several semesters using a combination of self-assessment questionnaires, document analysis, and performance-based assessments. The study confirms that targeted, practice-oriented digital competence development can lead to measurable progress in a short period of time. Students evaluated the course structure, teaching methods, and alignment with labor market expectations positively. The case study serves as a replicable model for other higher education institutions and can contribute to the integration of digital literacy into university curricula.

Keywords: *digital competence, higher education, DigComp framework, public administration training, ICT skills development, 21st-century skills*

Acknowledgement

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Introduction

The 21st century labor market is undergoing transformations shaped by digitization, automation, globalization, and demographic changes. To remain competitive, it is essential to have transversal key competencies that go beyond professional knowledge and enable individuals to adapt to a rapidly changing environment (OECD 2023). Digital competence encompasses not only technical skills, but also knowledge of information and communication technologies (ICT) and their critical, creative, and ethical use in various contexts of learning, work, social participation, and leisure (Ferrari 2013; Vuorikari et al. 2016, Vuorikari, Kluzer and Punie 2022). It is also a prerequisite for the development of other key competences. Critical thinking and problem solving are closely related to information processing in the digital environment, while adaptability and flexibility can also contribute to security in labor market transitions (Nemeskéri et al. 2016). As the development of digital skills is a lifelong process, it is also closely linked to conscious self-management and career orientation (Carretero, Vuorikari and Punie 2017). The Fourth Industrial Revolution has given rise to new types of jobs that require creative thinking and innovation skills (Schwab 2017). Effective communication and intergenerational cooperation, which are increasingly shaped by digital technologies, are essential for successful participation in the workplace.

Literature review

Higher education institutions are under constant pressure to adapt and develop, which is intensified by the accelerating processes of globalization and digitalization (Budevici-Puiu 2020; Burukina 2021). The information technology revolution has significantly transformed teaching and learning processes, changing students‘ learning characteristics and expectations of training (Edge et al. 2022). Educational institutions were most strikingly confronted with this change during the Covid-19 pandemic, when digital and online education became a necessity and educational institutions were forced to switch to digital education overnight (Ferri, Grifoni and Guzzo 2020; Ramírez-Hurtado et al. 2021). Although the forced transition brought many challenges, the pandemic also acted as a catalyst, promoting the adoption of new pedagogical and digital methods. In Hungary, following Covid-19, several higher education institutions established teaching methodology and digital competence centers with the aim of developing the digital and pedagogical skills of teachers (Bodnár 2024). At the same time, the challenges generated by these changes are not limited to the technological dimension: the economic environment, funding, student expectations, and social changes (such as increased diversity) all require new responses from higher education (Edge et al. 2022; Sarda, Kasatkina and Vries 2023).

A higher education institution is considered successful if it prepares its students for the labor market. The rapid transformation of the labor market requires skills that even educational institutions often do not have complete, prior knowledge of. At the beginning of the 21st century, competency lists appeared that listed the skills

essential for success in the labor market of the future: global awareness, innovation skills, creativity, media literacy, leadership skills, responsibility, and digital competence (Partnership for 21st Century Skills 2008). Why are 21st-century competencies so important? The reason for this is that there is a competency gap between what is learned in school (whether in public education or higher education) and the competencies needed in practical life (workplace, everyday life) (Vass 2020). This study focuses on digital competence among the aforementioned competencies. For the purposes of this study, it is important to define the concept: „Digital competence means the confident and critical use of information and communication technologies in work, leisure, and communication. The concept encompasses the ability to search for, evaluate, store, create, present, and transfer information, as well as the ability to communicate online and participate in networks“ (Dringó-Horváth et al. 2020, 174). Over the past decade, we have seen the importance of digital competence grow in social, economic, and administrative systems. Digital literacy is not a technological issue, but has become a fundamental social and economic factor that determines the opportunities for individuals and communities to succeed (Budai 2022).

Hungary and the digital divide

The digital divide is a significant challenge in Hungary. It particularly affects older people, those with low levels of education, and residents of rural areas, while the digital skills of younger generations do not always meet international expectations (OECD 2021), as evidenced by declining trends in international assessments, such as PISA results. Both the European Union's Digital Education Action Plan (European Commission 2021) and Hungary's Digital Well-being Program 2030 have set the goal of developing digital competencies on a broad scale, but in practice we often encounter fragmented initiatives that do not build on each other. Although access to digital tools has improved in recent years, their use remains uneven, and the education system is unable to keep pace with the rapid pace of digital transformation. Digital skills have become a fundamental asset in the labor market, as the Fourth Industrial Revolution requires new forms of knowledge and skills that are becoming increasingly important as traditional knowledge is becoming increasingly obsolete. The European Union and Hungary have developed several comprehensive strategies, such as the Digital Education Strategy and the Digital Welfare Program, but their effectiveness has been mixed, partly due to slow adaptation and partly due to implementation difficulties. Intervention attempts—such as IKER training, Digital Theme Week, and various device distribution programs—have contributed to the development of digital competencies, but they have typically remained isolated, have not built on each other, and have not offered a comprehensive, systemic solution. The development of digital competence is not only an economic interest but also a social one. A 1% increase in digital literacy can generate an additional HUF 34.7 billion in GDP per year. Failure to develop digital competence, on the other hand, increases social inequalities and economic burdens in the long term (Budai 2022).

The DigComp framework and its significance

Anusca Ferrari's study DigComp: A Framework *for Developing and Understanding Digital Competence in Europe*, commissioned by the European Commission's Joint Research Centre (JRC-IPTS), is widely considered a milestone in the definition of digital competence at the European level. The aim of the document was to provide a common framework for interpreting, developing, and measuring digital competence in the fields of education, the labor market, and social participation. The first version was produced in 2013 (Ferrari 2013), followed by several updates: DigComp 2.0 (2016) contained updated concepts but did not yet define levels (Vuorikari et al. 2016). DigComp 2.1 (2017) introduced eight proficiency levels (Carretero, Vuorikari and Punie 2017), which made it possible to measure skills from basic to advanced levels. DigComp 2.2 (2022) is the latest version and responds to the latest technological and societal challenges, such as the use of artificial intelligence, the fight against disinformation, sustainability, and digital well-being (Vuorikari, Kluzer and Punie 2022).

The framework (DigComp) has identified five main areas of competence:

1. 1. Information and data management – searching for, evaluating, and processing information.
2. 2. Communication and collaboration – responsible use of digital channels, community participation.
3. 3. Digital content creation – creating and editing content, copyright awareness.
4. 4. Safety – data protection, cybersecurity, digital well-being.
5. 5. Problem solving – dealing with technical failures, creative use of new technologies.

The framework breaks down each area into several specific competencies and provides level descriptions to support the development of curricula, training programs, and policy strategies. The material provides support for citizens to use digital technologies and the new systems behind artificial intelligence confidently, critically, and as safely as possible. The material also highlights the new expectations that have emerged in a short period of time in the area of digital competence, which is considered a key competence in the labor market and must be met in most workplaces. Digital readiness and competence are considered competitive factors for 21st-century employees. This is also clearly indicated by the proficiency levels of the reference framework. In addition to other competencies, the development of digital competence has become an important task for higher education, as it is expected that within a few years there will be few workplaces where a high level of digital competence is not required. This is particularly relevant for public administration training, as graduates from these programs will become the operators of e-government.

The working conditions of public service employees are constantly changing, and the digital transition is having a major impact on this sector. The public service needs civil servants who are well equipped to address the challenges of the 21st century.

This places significant responsibility on higher education institutions, as they must apply teaching methods (Tawafak et al. 2020) that equip students with up-to-date skills for dealing with problems in the workplace (Elliott, Bottom and O'Connor 2023; O'Neill 2022; Rubaii 2016). The complex challenges facing the public service are also reflected in the training process, and the responses to these challenges also affect the teaching of individual subjects, requiring a paradigm shift (Benenson et al. 2022; O'Leary 2002). Students must be prepared to deal with new problems in innovative ways in order to perform effectively across various areas of public service (Alford and Brock, 2014; Brock and Alford 2015). The subject of digital competence development is closely linked to the competence development practices and established approaches of students preparing for public administration (Belényesi 2009, 2010; Budai, Csuhai and Tózsa 2023; Horváth 2011).

Developing digital competence requires changes in infrastructure, methodology, and pedagogy on the part of higher education institutions (Farid, Ahmad and Alam 2015; Lepori, Cantoni and Succi 2003; Rogers 2000; Santosa, Batistaa and Marquesa, 2019). One of the fundamental tasks of higher education institutions is to support their students' success in the labor market. In addition to knowledge-based education, the focus has shifted to competence-based education. The presence of competences also contributes to the success of higher education studies, as certain competences are already necessary to complete the studies: 1. attitude (ability to work individually and in a team), 2. learning (passive, active, and future-oriented learning), 3. knowledge (more specialized, profession-specific knowledge and its application), 4. career management skills (Chiu and Chuang 2016). According to another approach, adaptive skills, entrepreneurial skills, teamwork, interpersonal skills, IT skills, technical and field-specific skills, and employability skills are important (Olivier et al. 2014). Since a large percentage of recent graduates typically start work as employees, technical skills and professional knowledge related to the job are most important for them. Higher education competence development should therefore focus primarily on technical skills and practical expertise in undergraduate programs. The possession of ICT competences and the highest possible level of proficiency have become a general and necessary requirement (Budai, Csuhai and Tózsa 2023; Vuorikari, Kluzer and Punie 2022). In Hungary, DigComp is also a reference point in IKER training, the Digital Wellbeing Program, and higher education competency development courses. The example of Ludovika University demonstrates that the framework can be used to develop students' digital skills in a targeted manner and achieve measurable progress in a short period of time (Budai, Csuhai and Tózsa 2023).

In order to develop digital competence, several key questions need to be answered. What do we consider digital competence to be? Is the use of devices consistent with domestic education? How can digital knowledge be measured? (M. Pintér 2019) The situation is more complex than public discourse and the literature suggest (Jenkins 2013; Prensky 2003; Tari 2011). The younger generation may have been born into a digital society and may have relatively higher levels of digital competence, but they do not necessarily have the information and communication skills required by the labor market (Budai, Csuhai and Tózsa 2023; M. Pintér 2019). At the

same time, they really need digital content to complete their studies (Besenyei 2010). The development of ICT skills must begin at secondary school level (Bell, Andreae and Robins 2014) so that a solid foundation can be laid for the development of skills at university.

Digital competence development in higher education – presentation of good practices

Institutional context of good practice

The Ludovika University of Public Service occupies a unique place in the Hungarian higher education system: the institution specializes in training in public administration, public service, and law enforcement. As a result, digital competence is not only a fundamental asset for students‘ studies, but also for their future professional careers. E-government, digital administration, and data-driven decision-making are areas in which recent graduates must immediately prove themselves (Budai, Csuhai and Tózsa 2023). For this reason, Ludovika University introduced a course on «Digital Competence Development» a few years ago. The course is compulsory for first-year students and is based on the DigComp 2.1 framework. The aim is for students to acquire not only basic user skills but also the higher-level skills that are essential in public administration jobs, such as legally compliant content management, online communication and collaboration, data protection and security, and digital problem solving.

We drew on several sources to present good practices. As background research and empirical results, we took into account the results of a previous study, conducted in the spring semester of the 2022/2023 academic year (Budai, Csuhai and Tózsa 2023). In addition to the questionnaire, we also conducted a document analysis as part of the research, which involved comparing the subject data sheet and the course syllabus. The first survey using the questionnaire we developed took place in the spring semester of the 2023/2024 academic year. The questionnaire was based on a questionnaire used to measure several aspects of the then-prominent paradigm-shifting pedagogical program, thus serving not only to measure competencies but also to measure the methodological and pedagogical outcomes of the course. The course was attended by 177 students, of whom 109 were full-time students and 68 were part-time students. The questionnaire was sent to all participating students. Full-time students filled out the questionnaire in the classroom after the last class, and 62 of the 109 students provided valid responses. Thus, almost 60% of the total number of full-time students responded, which can be considered a high response rate. There were a total of 68 correspondence students on the course, of whom 11 completed the questionnaire. The questions focused on the development of competencies, and students had to assess their own progress in each area. Full-time students had 28 hours (theory) + 28 hours (practice) available for development, while correspondence students had 8 hours (theory) + 8 hours (practice). Due to the low

number of hours in the correspondence course and the low number of responses, we did not evaluate their answers, but only worked with the answers of the full-time students. The questionnaire is administered each semester, and the course syllabus has also been revised to include the use of AI tools and the presentation of VR possibilities among the topics of the foundation course.

The research did not include testing the self-assessment responses. Digital competence was measured directly through classroom assignments, with two practical exercises measuring the application of competencies, and knowledge acquisition was measured through a Moodle test. The effectiveness of classroom tasks is demonstrated by document analysis, which compares the DigComp 2.1 reference framework and the subject syllabus, and also presents tasks aimed at competence development. The results of the research are presented in the form of a case study, which we interpret as a good practice to be followed. There were at least three clearly identifiable reasons for introducing the subject . One was that there were significant differences in the digital competences of the students attending the training. Another was that the training of students graduating from the program places a strong emphasis on public administration informatics and preparation for digital public administration, which they can only successfully complete if they have a solid foundation in digital competencies. The third reason, which we already mentioned in the literature review, is that although we refer to this generation as digital natives, their digital literacy does not extend to the confident use of computer programs (word processing, spreadsheets, database creation, etc.) that are important in their future work.

Research questions

RQ1 Is it possible to achieve demonstrable digital competence development in the competencies defined in the DigComp 2.1. reference framework within the framework of the Digital Competence Development course?[1]

RQ2 In which areas of competence can results be achieved during a semester-long course?

RQ3 Do students find the targeted areas of competence useful in relation to their university studies and future workplace?

Results

The questionnaire survey conducted in the spring semester of the 2022/2023 academic year aimed to assess digital competences based on self-reporting. The research addressed three research questions, the first of which was identical to the

[1] The content of the research question is identical to the first question in the previous questionnaire survey for this subject.

first question in our research (Can a significant improvement in digital competence be achieved with a 30-hour theoretical and 30-hour practical university skills development course? The research consisted of an input and an output measurement. The input measurement took place before the start of the course and was completed by 120 students, while the output questionnaire was completed by 58 students. The output measurement took place at the end of the course. Based on the input measurement, students estimated their own digital competence level at 63.3%. They identified information retrieval and data management as their highest rated areas, and digital content creation and problem solving as their weakest areas. After the 30-hour theoretical and 30-hour[2] practical course, the overall competence level increased by 2.86%. The greatest improvements were in skills (+3.19%) and digital content creation. (+10.65%). The differences between the input and output measurements are shown in Figure 1 (Figure 1). The authors of the study answered the first research question with a clear yes (Budai, Csuhai and Tózsa 2023).

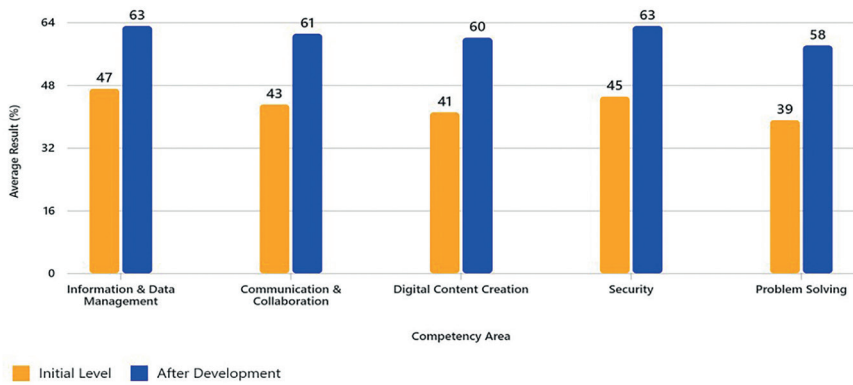

Figure 1: Development of digital competence among students in the spring of 2023 (Source: Own editing based on Budai, Csuhai and Tózsa 2023)

Document analysis

During the document analysis, we compared the DigComp 2.1 reference framework with the course syllabus in order to examine the extent to which the competence areas identified by the reference framework and the course syllabus overlap. The first column of the table contains the competence areas of the reference framework, while the second column indicates their relevance to the course syllabus. The third column lists the areas that were given greater emphasis in the course, which could

[2] The study mentions 30+30 hours, but given the semester schedule, this means 28+28 hours in practice, as there are no classes scheduled for the last week, which is a make-up week.

be completed for extra credit as homework assignments, and which played a major role in the development of competencies (Appendix 1, Table 1). According to the course syllabus, the aim of the course is to impart skill-level, competency-developing knowledge. In line with the DigComp 2.1 reference framework, it aims to develop proficient digital literacy, complemented by an introduction to the basics of e-administration (public administration and commerce).

The course focused on competence development through classroom assignments, exercises, and homework tasks. There were five assignments related to the classroom tasks, which could earn extra points. The first assignment was to create a resume, which required both text and image editing skills. The resume had to list the 21 competency areas that the students claimed to already possess. The second task was to prepare a 2-page initial text, which required literature research and data collection and had to be formatted according to the specified criteria. The two tasks were related to competence areas 1 (Information and Data Management) and 3 (Digital Content). The third task was to prepare a newsletter, which could be worked on in pairs or trios, on a shared online collaboration platform (Canva). This task was related to competency area 2 (Communication and collaboration). The fourth task was to examine and analyze the website of a public administration organization, which was related to areas 4 (Security) and 5 (Problem Solving). The fifth task was to create a Kahoot test, which tested the topics covered in the course lectures. This task covered many areas and, in addition to testing knowledge, also developed online collaboration (competence area 3). The Kahoot test was completed by students in pairs or trios. The Kahoot test always took place in the first few minutes of the practical lesson.

The findings indicate that development took place in all five competency areas. Based on the instructor‘s decision, the greatest emphasis was placed on those areas that students will need during their studies and for writing their theses (information and data management, communication, and collaboration). Naturally, development also took place in the other three areas, as the optional homework assignments, which could earn extra points during the semester, were related to all five areas of competence.

Questionnaire Survey

The questionnaire was based on the one used for the university‘s training development,[3] supplemented with a section on digital competence areas. The questionnaire asked about the effectiveness of the course, learning organisation, teaching methods, and progress in the digital competence areas. The questionnaire asked about the structure of the curriculum, perceptions of the course content, opinions on the support of learning methods, the development of digital competences and proportional accountability, aligned with the research questions. Respondents gave a score close to four out of five on the structure of the course content. The course

[3] The questionnaire was prepared and evaluated by the staff of the Creative Learning Office.

content itself was rated slightly lower than anticipated (3.79) and the methods used were also rated below four (3.69). For development in the use of digital tools and platforms, students gave a score of 3.66. The highest score was given to the relationship between accountability and course content (4.18) (Figure 2). When measured on a scale of four, student perceptions were basically close to a four, indicating that changing the course content and methods would be worthwhile in terms of their usefulness.

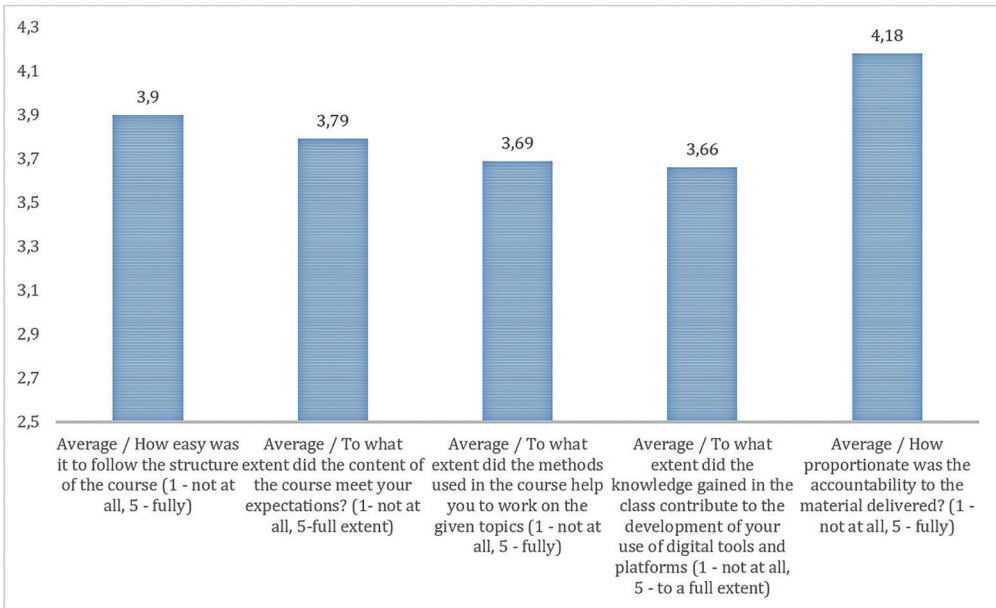

Figure 2: Average scores for questions on the effectiveness of full-time courses (own editing)

The development of digital competence per domain was measured as a percentage. Of the 21 competency areas, we selected those that were developed during the course. For each competency area, we asked what percentage of respondents perceived improvement in that area: 81% of students indicated that they had improved in the area of *digital content editing*, 79% in the area of *copyright and licensing*. *Filtering and evaluating information*, *browsing*, *searching and creating digital content* also scored highly (77%). *Creative use of digital technologies* also scored relatively highly (73%), as did *managing digital content* (71%). *Performance evaluation skills* were 10% below 70% (69%). *Digital collaboration* scored well above 60%, and *communication and digital interaction* also scored 66%. *Other skills* above 60% were *solving technical problems* (65%), *protecting personal data and privacy* (63%) and *managing digital identity* (61%). The lowest scores were for *programming* (29%), *protecting the environment* (32%) and *protecting health and well-being* (44%) (Figure 3). The latter did not actually feature in the 14 sessions of the course.

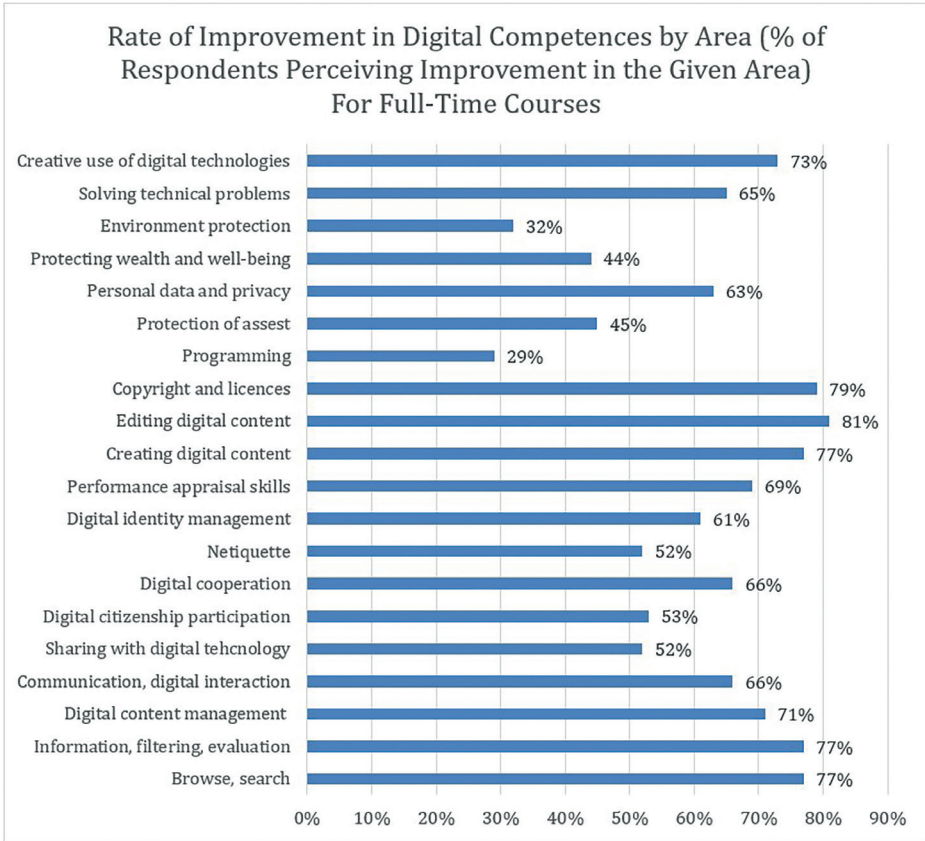

Figure 3: Rate of improvement in digital competences per area (own editing)

The questionnaire also included open-ended questions, which we coded and summarized based on frequency. Among the responses to the questions, we highlight those in which students referred to their achievements in the area of competence: for the positive factors in the lessons, the helpful teacher‘s attitude was preceded by a sense of progress and usefulness; and the good classroom atmosphere and extra credit system were also important. Positive factors were, for example, *„I learnt how to make a poster and write a CV*“, *„It was good to have lots of homework for extra credit*“ or *„The class was very good”,* or that *„I was happy to have a proper CV that I can submit anywhere and I think it‘s important that we learned how to handle references*“.

Digital Competence Development at Ludovika University: A Comparison of Two Questionnaire Surveys

We compared the results of the two surveys using the same criteria and examined how similar and different the results were when the course was assessed at two different points in time (Appendix. Table 2). The 2023 study used quantitative methods

to examine changes in competency levels, taking demographic factors into account, while the 2024 study used a qualitative approach, employing document analysis and questionnaire-based data collection. Students evaluated the course on a four-point scale, with the highest score attributed to the proportionality of the curriculum and examination (4.18) and the lowest to the development of digital tools and platform use (3.66). According to the document analysis, there was improvement in all areas of competence, particularly in digital content editing (81%), copyright and licensing (79%), and information filtering, browsing, and content creation (77%). There was a significant improvement in the creative use of digital technologies (73%) and content management (71%), as well as in the area of communication and collaboration. The questionnaire survey confirmed that a large proportion of students experienced improvement in the areas of focus, so overall, both studies provided a comprehensive picture of the opportunities and challenges of digital competence development at Ludovika University.

Further measurements

Measurements taken in the fall of 2024 confirmed that the course resulted in significant digital competency development in a short period of time. Students‘ self-assessments improved in all dimensions examined, particularly in the areas of digital content creation, information retrieval, data security, and problem solving. The degree of improvement was typically 10 to20 percentage points and was most pronounced among those who started with weaker competencies. „I won‘t start here“ category has almost completely disappeared, with the proportion of independent solutions increasing by 10 to20 percentage points. The greatest practical value was seen among students who were initially weaker. Persistent weaknesses were observed in managing social media privacy settings and complex document formatting (Figure 4.).

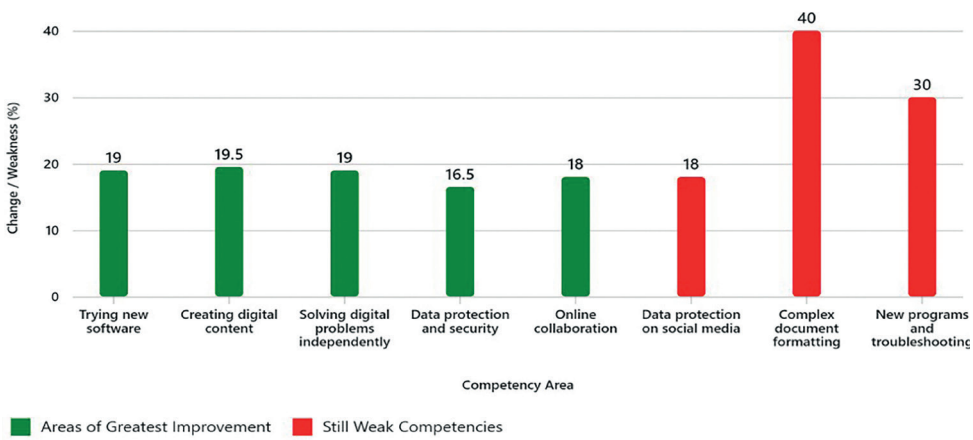

Figure 4: Areas showing improvement and areas that remain weak (own editing)

The greatest improvement was in the areas of trying out new software, creating digital content, problem solving, and data security skills. Basic competencies (file management, searching, email) were already strong, but measurable progress was seen here as well (Figure 5).

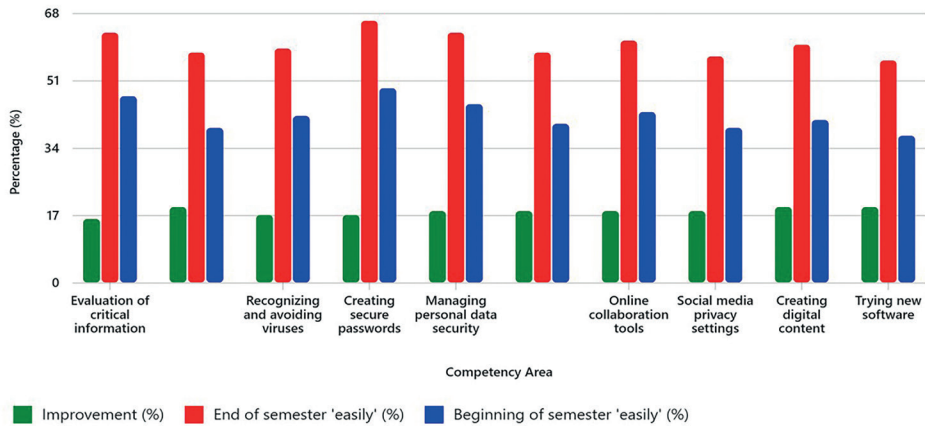

Figure 5. Areas of competence showing the greatest improvement (own editing)

The course brought tangible improvements in the short term, especially among the less confident students, who made the most progress. This is the greatest value of the program

Discussion

Several European Union documents demonstrate that key competences need to be addressed in the field of education, and in particular in higher education. As many aspects of life, including citizenship and learning, become increasingly digitised, digital literacy is highly valued and has become an indispensable prerequisite for navigating and thriving in the knowledge society.[4] Accordingly, the European Commission amended the DigComp 2.1 reference framework published in 2017 (Carretero, Vuorikari and Punie 2017) in 2022 (Vuorikari, Kluzer and Punie 2022). The new reference framework now includes additional knowledge, skills and attitudes elements. It also indicates how rapidly this area is changing and how new expectations in the area of digital competence are challenging in the workplace.

Higher education must also respond to global and labour market expectations. To prepare future workers, the specialised higher education institution in this study

[4] European Skills, Competences, Qualifications and Occupations.

is micro-educating its graduates in public administration. Indeed, one of the specific specialisations in the study (BA in Public Administration Management) is public administration informatics. The students graduating from this course are expected to become the future operators of eGovernment, thus responsibility is laid on the training institution. The working conditions of civil servants are significantly affected by the digital transformation. Preparing the right workforce is a key responsibility for higher education institutions, using well-chosen teaching methods (Tawafak et al. 2020) that will equip students with up-to-date competences to deal with the challenges and expectations of the workplace (Elliott, Bottom and O'Connor 2023; O'Neill 2022; Rubaii 2016). Responses to the challenges in public service must already be reflected in the preparation of students, which necessitates a paradigm shift in the teaching-learning process (Benenson et al. 2022; O'Leary 2002). This was also pointed out in the comparative analysis of the competences formulated by the Framework of Reference (Carretero, Vuorikari and Punie 2017) and the subject matter and course content. Moreover, the development of course content and the adaptive introduction of new methodological solutions require continuous attention to enable higher education to meet the ever changing expectations and needs of students (Budai, Csuhai and Tózsa 2023).

Placing the need for competence development within the context of the continuous development of information and technological tools—one of the most rapidly changing areas of globalization—the results of our research can be interpreted as a response to the pressures of change and development that affect higher education institutions. The development of the course content is a good example of learning outcomes-based education (Fryer, McKinney and Trimble 2006; Biggs and Tang 2007), but it also responded well to the development of the competency areas articulated in the Digcomp 2.1 framework. In the case of the degree course we are examining here, it can certainly be said that it is necessary to prepare students for the labour market. Global awareness, innovation, creativity, media literacy and responsibility, which are among the 21st century competences expected of young workers, were all developed on the course. Furthermore, students require these 21 areas of competence to succeed in their studies. The effective implementation of digital competence development requires infrastructural, methodological and pedagogical changes on the part of educational institutions (Farid, Ahmad and Alam 2015; Batistaa and Marquesa 2019; Lepori, Lorenzo and Succi 2003; Rogers 2000). The different levels of knowledge and skills of students also needs to be taken into account (Edge et al. 2022; Sarda, Kasatkina and Vries 2023) which could be compensated for by the introduction of optional but credit-bearing homework assignments. The latter scoring system increased students' academic achievement (Bean 1980; Spady 1971; Kerby 2015). The development of course content here also took into account the development of competences that were not intended to support successful placement in the labour market but rather to support the proper completion of university studies. These developed students' attitudes (through individual and teamwork participation), their ability to learn (passive, active and future-oriented learning), certain knowledge elements (specific, profession-specific knowledge) and career management skills (Chiu-Chang 2016). The latter was contributed to by the

task of preparing digital CVs, as well as the creation of online newsletters and the management and filtering of digital content. Student feedback clearly showed that a high percentage of respondents had improved in this area.

The introduction of the course was necessary because teachers felt that students in the new intakes were becoming decreasingly familiar with computers and computer programs. This is in contrast with what has been reported in the public discourse and literature on the media literacy of digital natives (Jenkins 2013; Prensky 2003). It seems claims about *digital natives* cannot be disputed, but care must be taken in university education to ensure that these young people are able to use not only the tools and applications that they are familiar and comfortable with, but also those that will be expected of them later on, whether as a part of their studies or in the workplace (Budai et al. 2023). The development of ICT competences needs to begin in secondary school, so that the development of competences at university can start with a solid foundation (Bell, Andreae and Robins 2014).

Summary

The study examines the importance of developing digital competence in higher education, with a particular focus on public service training. Due to the demands of the 21st-century labor market and the Fourth Industrial Revolution, digital competence, which includes information management, communication, content creation, security, and problem solving—has become a key competence. The research was conducted among first-year students of the National University of Public Service as part of a compulsory course based on the DigComp 2.1 framework. The study used self-assessment, document analysis, and performance-based tasks. The results confirm that targeted, practice-oriented development can achieve measurable progress in a short period of time, especially in the areas of digital content creation and creative technology use. According to student feedback, the structure and methods of the course are in line with the competence development principles outlined in the literature and meet the needs of the labor market. The study emphasizes that digital competence is not only a technological but also a social and economic factor, the development of which is essential for those preparing for a career in public service. The good practice described can be adapted to other higher education institutions, contributing to the integration of 21st-century skills into university education.

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Appendix

Area of Competence Indicated by the Framework of Reference	Area of Competence Indicated in the Subject Programme	Note - Implementation on the Course
1. Information and Data Management		
1.1. Browse, search and filter data, information and digital content	Digital research methodology (evaluation and exploitation of information and data repositories, knowledge content)	Familiarisation with databases (international and national), online encyclopaedias, public administration knowledge base. Task 1: Create your own CV, update an existing one. Set your own SMART goals
1.2. Evaluation of data, information and digital content	Digital research methodology (evaluation and exploitation of information and data repositories, knowledge content)	Learning and practising the basics of research methodology, data collection and citation styles.
1.3 Managing data, information and digital content	Digital research methodology (information and data repositories, knowledge assessment and exploitation)	Assignment 2: Write a 2-page text based on the use of a database, referring to data according to the appropriate rules
2. Communication and Cooperation		
2.1. Interaction through digital technologies	Learning collaborative spaces: rules for internal communication, use of online platforms	Use of university social networking sites (digital course materials library)
2.2. Sharing through digital technologies	Learning collaborative spaces: rules for internal communication, use of online platforms	Task 3: Editing a newsletter in Canva, individually or in a group
2.3. Citizen participation through digital technologies	E-citizenship, e-services, e-government (Client Gateway), e-commerce I.-II.	Use of online administrative interfaces, client portal

2.4. Collaboration through digital technologies	Learning collaborative spaces: rules for internal communication, use of online platforms	Joint editing in Canva (pair and group work) Task 5: Preparation of a test in Kahoot for the lecture material and the relevant textbook chapter (fixed task, week by week) Learning and using an online office suite (Forms, Whiteboard, Sway, One drive)
2.5. General rules of etiquette for network communication (Netiquette)	Digital records, database management Digital space: organisational social media functions (methods, functions, possibilities)	Letter writing, internal communication, netiket
2.6. Digital identity management	E-citizenship, e-services, e-government (Client Gateway), e-commerce I.-II.	Confident use of the client gateway secure use and storage of passwords
3. Digital Content		
3.1. Creating digital content	Digital literacy I: creating and editing large documents, multimedia and web documents, graphics Content production: Libre Office funds, requests, applications Presentation techniques, methods, programs I. (PPT, Google slides, Prezi, other online interfaces)	Download images (learn about usage rights), image editing, pasting, poster making. Learning about simple image editing programs. Using Libre Office Confident use of Office
3.2. Editing digital content	Digital literacy II: creating and editing large documents, multimedia and web documents, graphics Content production: Libre Office funds, requests, applications Presentation techniques, methods, programs I. (PPT, Google slides, Prezi, other online interfaces)	Download images (learn about usage rights), find images, edit images, paste images, create posters Using Libre Office Confident use of the Office program downloading images (understanding rights of use), editing, pasting, poster making Using Libre Office Confident use of Office Make a presentation

3.3. Copyright and licences	Digital research methodology: searching for, evaluating and using information and repositories, knowledge content	Review of copyright and licensing, explanation of legislation Problems with the use of AI
3.4. Programming		
4. Security		
4.1. Protection of assets	Use of IT tools, mobile devices, cloud services, utilities	Passwords, settings
4.2. Protection of personal data and privacy	Digital records, database management Security awareness in the digital space	Passwords, settings, backups, cloud services (learning about university cloud services)
4.3. Protecting health and well-being		
4.4. Environment		
5. Problem Solving		
5.1. Solving technical problems	Theory and practice of UX	User needs, online responses
5.2. Formulating needs and technological responses	Theory and practice of UX	Task 5: Website testing and analysis
5.3. Active use of digital technologies	e-Citizenship, e-Services, e-Administration (Client Gateway), e-Commerce I.-II.	Digital citizenship, online administration,
5.4 Assessing digital competence gaps, remediation and repetition.		

Table 1. Document analysis

Criterion examined	Spring 2023	Spring 2024
Objective	Measurement of input and output competency levels based on DigCompSat	Evaluation of course effectiveness through document analysis and proprietary questionnaire
Method	DigCompSat self-assessment (n=120 input, n=58 output)	Comparison of DigComp 2.1 with the subject program + student questionnaire (n=62)

Developed competence areas	5 areas, measured based on DigCompSat	All 5 DigComp areas covered
Greatest improvement	Content creation (10.65%), skills (9.43%), security awareness (27.29% among 35–39-year-olds)	Digital content editing (81%), copyright (79%), information filtering (77%)
Least progress	Programming, security, problem solving showed a decline among 30–34-year-olds	Programming (29%), environmental protection (32%), health protection (44%)
Student satisfaction	Average competency level: 63.3%, positive shift after the course	Average rating: 3.66–4.18 (on a 5-point scale)
Demographic effects	No significant differences based on age or prior education	The sample consisted of the same age group, no further details provided
Gender differences	Men started at a higher level, women showed greater improvement (average +8.85%)	No details provided
Age group effect	35–39-year-olds improved the most, 30–34-year-olds overestimated themselves	The sample consisted of the same age group, no details provided
Conclusion	Competence development is possible in a short period of time, but self-assessment is not reliable	The course fits well with the DigComp framework and is useful for students

Table 2. Comparison of the results of the two questionnaires (own editing)