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A Case Study on the Development of Digital Competences of Teachers at the University of Ljubljana

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Abstract

The renewed 2017 EU Higher Education Agenda expresses the intention to "develop and implement a digital readiness model" to assist higher education institutions, their staff, and students in implementing digital learning strategies and maximising the potential of cutting-edge technologies such as learning analytics. The anticipated digital transformation will only be successful if higher education institutions and teachers strengthen their digital competences and skills and "become" digitally competent. Many of the incentives for these processes were prompted by the unexpected Covid-19 crisis, which highlighted the importance of higher education teachers' digital skills in the need to digitise the higher education environment. The Covid-19 crisis experience and the accelerating development of digitalisation are changing both the conditions for education and education itself, which is why higher education teachers face the challenging task of lifelong development of digital competences. To complete this task, they must learn about information and communication technology (ICT)/digital technologies and how they can be integrated into the pedagogical process. The challenge for higher education teachers is to develop ICT-based teaching. This is not about how higher education teachers (and students) master ICT, but about how to make ICT one of the tools for carrying out pedagogical activities in general.

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The article addresses the development of digital competences among higher education teachers as a critical issue in the renovation of higher education didactics. To that end, various digital competence models and concepts are presented. Among other things, the European Digital Competence Framework for Teachers is highlighted. The case study of activities aimed at developing digital competences of higher education teachers at the University of Ljubljana (Slovenia), and thus higher education teachers working in the field of education for public administration. Based on the analysis of activities, we discover an increased interest in the development of digital competences, which is reflected in various forms of institutional (university) support for educators (e.g. training), as well as an increased interest in the development of digital competences among higher education teachers.

Keywords:

Digital Competence Framework for Educators (DigCompEdu), digital literacy, higher education, teachers' digital competences

1. Introduction

We live in a digital society characterised by rapid and profound knowledge-based changes (OECD, 2016). Citizens in this society are expected to acquire knowledge, to be able to handle this information, and to use it appropriately in their personal and professional lives by selecting the information available. Rapid technological progress, societal development, and the expansion of digitalisation highlight the importance of special skills, new skills, and competences. Among them are digital competences, which serve as a "bridge" to understanding and promoting digitalisation challenges, including in higher education. As such, digitalisation is a response to the challenges confronting policymakers and the labour market, who "communicate" that creativity, adaptability, and innovation are desirable qualities of the workforce and society. It follows from the preceding that there is a need to reform "education systems" in order to develop those abilities. With an increasing ability to use digital technologies in learning, new generations of students expect to use at least the digital tools they use in their daily lives during their studies. Many expect even more. As a result, they bring a new dimension of expectations to higher education, necessitating a new level of digital competence from teachers. This is especially true given that, on the one hand, there are often environments marked by increased access to information technology and, on the other hand, existing approaches to education, teaching, and learning are often still very traditional (without digital elements).

Prior to the outbreak of the Covid-19 pandemic, higher education institutions (e.g., UL) took advantage of the opportunities provided by digitalisation, owing to the attitude of higher education teachers toward this issue. Many higher education teachers still prefer to spend their time researching the profession rather than honing

their teaching skills (pedagogy). Furthermore, there are few study programmes that have been implemented online (except during the Covid-19 crisis). We believe that one of the possible reasons for this is the (low) level of competence development required to operate in the digital learning environment, as well as the lack of incentives for teachers to change their teaching practices. During the Covid-19 crisis, higher education institutions were forced to improve the practice of implementing study programmes and, as a result, teaching. Some foreign experiences (Eliasson, 2020) demonstrate significant changes in the incorporation of technology into the pedagogical process, a significant contribution of teachers and other (support) staff to the creation of "effective pedagogy", increased cooperation among higher education institutions, and the need for institutional support in the further development of higher education digitalisation. As a result, higher education institutions have been identified as critical players in the development of digital skills among higher education teachers and students. However, there are numerous obstacles to the development of digital literacy in higher education (in addition to access to technical equipment and ensuring adequate access to the Internet). The lack of knowledge and skills of higher education teachers in designing high-quality distance learning appears to be primarily due to (previous) limited incentives to digitalise teaching. Simultaneously, the rapid transition to the new system (Covid-19 crisis) appears to have provided incentives in and of itself, and most higher education teachers' knowledge has expanded significantly faster than it would have in "normal" circumstances. Differences in the development of digital competences of higher education teachers and their use in the implementation of study programmes, on the other hand, can lead to significant differences in the quality of distance learning in the event of non-systemic development. To avoid this, the development of digital skills of higher education teachers should be supported and mapped at the institutional level. The definition of digital competence (digital competences), digital literacy, and the appropriateness of using different digital competence models should all be addressed.

In this paper we discuss a recent example of institutional activities to develop digital competences of university teachers. Primarily, we were interested in the strategies and recommendations identified for the development of digital competences of HEI teachers. To this end, we present different approaches to defining and investigating the digital competences of HEI teachers based on the method of secondary source analysis. On this basis, we applied the case study method to analyse the approach and scope of digital competence development of university teachers at the University of Ljubljana (UL). As part of the study, we were also interested in how teachers at UL are institutionally supported in developing digital competences, and thus in understanding the content of digital competences. UL's activities in the area under study were analysed, and some examples of good practice were identified. Based on the theoretical findings and the case study conducted, eight dimensions and categories that contribute to achieving the expected level of digital competence development are highlighted as a result of the study.

2. Digital competences of higher education teachers

Living in an information society is a challenge for each individual because it necessitates the development and maintenance of a wide range of competences related to the use of ICT/digital media in a specific practice. Their application is not always obvious because these competences range from traditional literacy to more in-depth competences, such as an understanding of complex contexts (Livingstone et al., 2008). We can define digital competence in general terms as a dynamically structured combination of skills, knowledge and ways of thinking in the field of information, communication and digital technology (Saienko et al., 2022, p. 44). The need to strengthen digital competences also applies to higher education teachers who "guide" the development of knowledge and knowledge transfer through their pedagogical (professional) practice. Digitalisation is an even greater challenge for them. The development of digital competences is a feature of their functionality because it is directly related to the teacher's use of ICT in the learning process. Strengthening higher education teachers' digital competences affects not only the teaching, but also the higher education space as a whole. This includes professional practice developed by higher education teachers.

Digitalisation is defined as one of the major trends in the short- and long-term change of procedures, processes, and activities in society, individual social systems and subsystems, as well as the individual's relationship to those systems and to himself as an individual. The potential for digitisation and expectations for the transition to a digital (and green) society are high, as highlighted in strategy papers by both the European Commission (EC) and national policy, e.g. the 2030 Policy Programme "Path to the Digital Decade", EU 2030 Digital Compass (European Commission, 2021), Development Strategy of Slovenia 2030 (Vlada Republike Slovenije, 2017). The activities of the European Commission provide the most general insight into the situation, as it has been monitoring (measuring) the "skills of Internet users" and "advanced skills and development" throughout the EU since 2014, in order to stimulate and ensure people's competence for the digital decade (the EC aims to have at least 80% of adults with basic digital skills by 2030). The Digital Economy and Society Index (DESI) (European Commission, 2022) measurement includes the measurement of digital skills across the EU by presenting digital competence indicators across the EU. The measurement emphasises human capital in particular (one of the four main directions of the EU digital compass).

In the field of higher education, the 2017 Renewed EU Agenda for Higher Education (European Commission, Directorate-General for Education, Youth, Sport and Culture, 2017) stated the intention to "develop and introduce a digital readiness model" to assist higher education institutions, their staff, and students in implementing digital learning strategies and maximising the potential of cutting-edge technologies, such as learning analytics. Based on the need to digitise the university environment, higher education teachers' digital competences are the focus, and higher

education teachers have a different attitude toward them (in terms of affection). Their self-evaluation of their own digital competence development is frequently unrealistic. When higher education teachers, for example, assessed their skills in using digital tools and social networks (Facebook, Twitter, LinkedIn, Instagram, and YouTube), they assessed themselves as competent (Casillas Martín et al., 2020, str. 217), but when asked to assess their skills in various, more demanding digital concepts that can be used in teaching (e.g. cloud storage, cyber activism, podcasts, and web 3.0), many teachers gave themselves a grade that demonstrates a low level of digital competence. Teachers recognise that they have a low or medium-low digital competence, as well as the absence of certain competencies, especially those related to the evaluation of educational practice (Teachers' digital competencies in higher education: a systematic literature review (Basilotta-Gómez-Pablos et al., 2022, p. 1).

On this basis, we can conclude that digital tools are still used for social integration rather than pedagogical work (Casillas Martín et al., 2020; Kimbell-Lopez et al., 2016).

3. Technologically supported education, learning and digitization

Technology is humanity's innovation. The use of technology in education enables educators to create a differentiated learning environment for each student. Views on the role of information technology in education are influenced by beliefs about the role and importance of education in general. At the forefront are issues such as, Does it aim to be economic, social or occupational? Is its role to assess and issue diplomas to students or to promote their intellectual and social development? Should higher education aim to assist individuals in their lifelong development, provide the economy with an adequately trained workforce or provide educational products that institutions can market (Harpur, 2010)? Whatever the issues, the fact that future higher education will be very different from traditional higher education is precisely because of technology and all that man can do with its help. As a result, the digital competence gap between higher education teachers will widen further. However, technology will not replace good higher education teachers, but it can further improve them and act transformatively (Couros, 2015). Educational technology, both online and offline, changes students' attitudes toward learning, making it more interactive and thus more appealing. This does not mean that higher education teachers need to become ICT specialists. Rather, it means that they have interesting answers to the challenges posed by ICT and thus new opportunities for work (teaching).

This necessitates higher education teachers devoting time and resources to content development and, more importantly, the "extension" of their pedagogical methods, which will include digital technologies and practices. Many in higher education refuse to accept this transformation or modernisation (Selwyn, 2014), but it

is becoming increasingly clear that this transformation is a new reality, which means that the transformation will be successful when higher education institutions and teachers increase their digital capacities in order to create an environment in which students can further develop (upgrade) their own digital competences. Given that such a transformation necessitates additional effort, the norms of direct and indirect pedagogical burden of the higher education teacher should be strictly adhered to.

There are various approaches and strategies for meeting the demands of digitalisation. For example, The Irish National Forum for the Improvement of Teaching and Learning in Higher Education has issued four recommendations for the advancement of digital capacities in higher education. These recommendations (National Forum, 2014) are as follows:

- Give priority in institutional and national policy and quality frameworks to the strategic development of digital capabilities in a way that supports innovation to achieve impact.
- Enhance and support collaboration within and between institutions, as well as with other parts of the higher education sector; create common policies and infrastructure that reflect the complexity of an increasingly digital world.
- Create a consistent, seamless, and coherent digital experience for students while actively engaging students and higher education teachers in the development of their digital skills and knowledge.
- Develop a solid evidence base for improved higher education pedagogy.

The Norwegian Digitalisation Strategy for the Higher Education Sector 2017–2021 (Departementenes sikkerhets- og serviceorganisasjon (DSS), 2017) emphasises the importance of utilising digital opportunities to provide all students with stimulating and diverse methods of learning and assessment. It states that students must acquire more general ICT and digital judgement skills (identification, access, evaluation, use, creation, and sharing of trusted digital information in a personal, professional, and academic context) in addition to academically relevant digital skills. Digitalisation makes research more efficient and creates new opportunities for collaboration, development within existing disciplines, development of new disciplines, and knowledge transfer to higher education practice. It also provides new ways to share research data and results, while posing new challenges in terms of data security and proper data management. One of its objectives is to integrate students into the academic community by utilising digital opportunities as part of active and diverse learning and assessment methods. As a result, students receive academic and digital qualifications as part of their study programmes, resulting in the best possible learning outcomes. Digitally literate higher education teachers can "pass on" adequate knowledge to them.

Universities are well aware of the rapid pace of technological change affecting education, which is why they provide adequate resources and plans for "correct and timely" implementation of change in many places. To this end, some universities (e.g. State University of Arizona, University of Missouri, RWTH Aachen University) have

designed a strategic framework of digitisation and curricular support to discover, evaluate and adopt new technologies in relation to the university, students and employees, which includes accessibility to solutions and best practices. They have developed recommendations for the planning of individual (technological) solution teaching, as well as information on the strengths and weaknesses of various tools (e.g. tools for assessing learning outcomes, compiling e-portfolios). Designed strategies and solutions "bring" opportunities for higher education teachers to learn about, test, and implement new technologies, tools, and resources. These include, for example, links to resources that facilitate learning about and using technology, web solutions, exercise files, or various approaches to experimentation in learning the profession (technology). The activities are intended to assist educators in educating on evolving technology and higher education pedagogy, resulting in a digital learning environment. They promote inclusive higher education pedagogy, as well as andragogy and heutagogy (heutagogy fully delegates control and responsibility for learning to the individual, understanding it as the most important learning factor). Higher education teachers are thus prepared and capable of "breaking down" the use of technologies, allowing them to do interesting things in the classroom by knowing technologies "from the inside and outside".

Although such measures are contingent on the development of institutional digital capacity strategies and the provision of adequate technical infrastructure, they appear to be a major impediment to human development, particularly on the part of higher education teachers. It is therefore necessary to design (develop) appropriate programmes for the development of digital literacy of teachers. Digital skills based on this need to be meaningfully integrated into the educational process. In these activities, particular attention should be paid to younger teachers.

This implies the need to ensure digital literacy of higher education teachers. On the basis of the report *Digital Education at School in Europe* (European Education and Culture Executive Agency, 2019), recommendations, and the adapted framework of digital competences for citizens, some general conclusions can be drawn (DigComp; information literacy, communication and cooperation, production of digital content, security, and problem-solving). In its broadest sense, digital literacy is defined from three perspectives: a know-how approach, a plural form of digital literacy (emphasising non-generic and multifaceted notion placement), and a reflexive approach (critical perspective). Discussions on the definition and evolution of digital literacy outline different levels or areas of digital literacy, such as social practices and open practices in digital spaces, or taxonomy as a more effective way of distinguishing significant differences between literacy and types of literacy (Stordy, 2015).

In EU and OECD documents, digital literacy is strongly linked to an individual's ability to live, learn, and work in a digital society, communication and cooperation skills, and learning to use digital tools and media to make informed decisions and achieve goals. The concept of digital literacy is linked to a number of different programmes and perspectives, from technical "knowledge", cognitive skills and social

practices, to proactively engaging in digital content (Spante et al., 2018, p. 14). As a result, it is possible to conclude that the issue of defining digital literacy or the necessary digital competences that result from it is primarily a matter of defining the framework of digital competences and the approach to strengthening them in a specific institution, all with the aim of creating excellent higher education teachers.

4. Digital competences and digital literacy of higher education teachers

Expectations for the development of digital content in education are high, which highlights the importance of developing educators' digital competences. Curricula renewal in terms of potential convergence with labour market requirements and the associated new vision of education through the development of digital competences applies not only to student learning but also to employee learning. It relates to increased responsibility for "own" learning, as the needs for developing digital competences are frequently individual and highly variable. Additionally, we need to understand educators' digital competence to support their professional development and consequently the quality of education migrating to more online teaching and learning (Sillat et al., 2021, p. 10). Various models (definitions, links) related to digital competences are presented below and can assist us in the definition and development of digital competences of higher education teachers.

4.1 Key competences for lifelong learning

The European Parliament and the Council of the European Union adopted a Recommendation on key competences for lifelong learning in 2006 (European Parliament, Council of the European Union, 2006), the content of which was later updated (European Commission, Directorate General for Education, Youth, Sport and Culture, 2019) or adapted in the field of work, including in the field of education and higher education. Digital competence, which includes the safe and critical use of information society technology in work, leisure, and communication, is one of the key competences for lifelong learning. Unlike other key competences, almost all European countries have a specific national strategy linked to digital competences, which is a unique feature of this article. These strategies can be broad, covering e-government, infrastructure and broadband connectivity, ICT security and e-skills development, and ICT in schools, or they can be narrowly focused on ICT in education.

Digital competence involves the confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking (European Commission,

Directorate General for Education, Youth, Sport and Culture, 2019, p. 10). According to the EU, the ability to seek, collect, and process information is one of the skills required for digital competence and related digital literacy. Digital competence also includes knowledge of the risks associated with the use of the Internet, communication via electronic media, exchange of information, cooperation in networks, research, and learning. Part of digital competence is understanding how physical and virtual reality interact and how they should be distinguished.

4.2 Skills for a Digital World (OECD)

The OECD Ministerial Meeting on the Digital Economy (2016) produced a report (analysis) on the effects of digital technologies on labour-market demand for skills and discussed key policies for the development of skills adapted to the digital economy in support of the New Market and Jobs panel. It was stated that the spread of digital technologies is altering the way people work, increasing the demand for additional skills such as information processing, self-direction, problem-solving, and communication. In this context, a description of digital skills or an OECD categorisation of digital skills has been prepared which includes ICT generic skills, ICT specialist skills, ICT complementary skills and Foundation skills (OECD, 2016, pp. 6–12).

ICT expertise includes skills that enable the development of products and services based on ICT solutions such as software, web solutions, e-commerce platforms, network management, and application development. Complementary competences include skills needed in the context of rapid digital development, such as flexibility for more agile work, leadership and planning, problem solving, and change management. Overall ICT competences include the ability to manage IT solutions in everyday work situations, such as obtaining information online and using various types of software.

A range of specialist ICT skills can be considered a version of digital excellence within this classification. Although the category of complementary skills does not explicitly require technical knowledge, it does include skills that enable the full exploitation and proper implementation of digital opportunities.

4.3 The Technological Pedagogical Content Knowledge (TPACK) framework

The TPACK framework (Mishra & Koehler, 2006) represents a way of thinking about the integration of technology in the teaching and learning process, and it can be used to understand the digital literacy skills required by higher education teachers. According to Mishra & Koehler, today's higher education teachers face a difficult task because all new technologies place new demands on their knowledge and teaching (Mishra & Koehler, 2008, p. 61). The TPACK framework contains technological-pedagogical-content knowledge, and the framework's theory can be interpreted as a

more precise way of understanding and analysing the use of digital tools in the context of teaching. The framework defines three competences: technological knowledge (TK), pedagogical knowledge (PK), and substantive knowledge (CK) (Mishra & Koehler, 2006, pp. 1026–1027).

Technological knowledge refers to understanding technology and how the teacher employs digital tools in the classroom. Because technology is a tool that is constantly changing and evolving, adaptation and learning in response to these changes are required. Different approaches to the use of methods and learning processes in teaching are referred to as pedagogical knowledge. Prior knowledge and skills of learners influence the teacher's approach to planning, assessing, teaching, and taking on leadership roles in the classroom. A higher education teacher's pedagogical competence refers to how strategies and methods are used in the learning process to help students develop and gain a deeper understanding of knowledge. The term "content knowledge" refers to the subject matter, which varies depending on the class in which it is presented. Higher education teachers must be knowledgeable about the subjects they teach, including facts, concepts, and theories in the subject area.

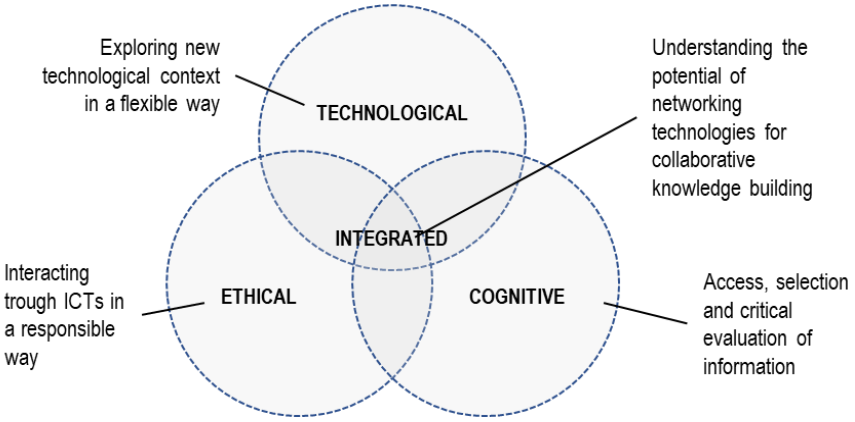
According to the theory, in order to achieve a meaningful whole in teaching, a higher education teacher must be able to combine these three competences. Finally, it is the interaction of various competences that allows for the successful use of technology in schools. As a result, the TPACK framework provides a means of understanding and reflecting on how current higher education teachers can successfully integrate digital tools into their teaching (Mishra & Koehler, 2008, pp. 2–3). The TPACK framework discusses how higher education teachers meet various competences when using digital teaching tools. To include technology in the course, the higher education teacher must have knowledge of technology as well as knowledge of the subject and knowledge of how to connect digital tools with the subject's content.

4.4 Digital Competence Assessment Model

The Digital Competence Assessment Model or DCA Model defines digital competence as a set of different ICT-related competences and other life skills. The definition emphasises the coexistence of dimensions distinguished by technological, cognitive, and ethical characteristics, as well as their integration (Calvani et al., 2009, p. 187). While the findings are based on a study of adolescents, the framework's elements can be meaningfully applied to the general population.

Figure 1:

Digital Competence Framework



Source: Calvani et al., 2009, p. 187

Technological competency involves the use of digital tools and media. It focuses on understanding the various functions of digital tools and media, as well as how to adapt to digital tools and deal with the various complications that may arise during their use. This includes the ability to solve technical problems and interact with various digital media, as well as selecting the appropriate approach and method for solving technical problems. This includes the ability to practice and apply a logical approach, as well as describe the process and the progression of the work process. This could include, for example, the ability to differentiate between how information and facts can be perceived and interpreted differently depending on whether they occur in digital media or in real life.

Cognitive skills include information management, innovation, content evaluation, and problem-solving. Information management includes access to information, identifying and organising it, developing critical thinking skills, and contributing to the next process (innovation). It is about being able to create new content with digital tools and media, as well as solving problems and thinking creatively. Working with digital tools and media requires the ability to critically verify information and thoroughly investigate relevant facts.

Ethical competence is the ability to communicate and share information in digital form in a respectful and responsible manner, while keeping ethical considerations in mind. It represents a respectful and responsible approach to expressing and sharing opinions on websites and social media, accepting responsibility for publishing content and being aware of how individual viewpoints and modes of expression can affect them and others in the digital world. It focuses on the abilities to use digital tools and media

to create and interact with others in a productive manner, as well as understanding how their creations can affect the environment and events in the real world. This may include, for example, protecting one's own personal information as well as the personal information of others when using social media. The integration of the three dimensions represents a specific aspect. It is about realising the potential of technologies that allow people to share information and collaborate to create new knowledge.

4.5 Digital Competence Framework for Educators (DigCompEdu)

The Digital Competence Framework for Educators (DigCompEdu) is the European framework for the digital competence of educators. It helps teachers at all levels of education to strengthen digital competences specific to the teacher's professional life. The main potential relates to the possibility of effective integration of technology in teaching and thus enabling the development of students' digital competences. Digital competences enable educators to maximise the potential of digital technologies. As a result, they are critically important for innovative education. However, just because someone is technically proficient does not mean they are a digitally competent educator. The digital competences of general users are not specific to teaching. DigCompEdu was developed on the basis of The Digital Competence Framework 2.0 (Vuorikari et al., 2016), which identifies the key components of digital competence in 5 areas which can be summarised as below (European Commission, Joint Research Centre et al., 2017):

- Information and data literacy: To articulate information needs, to locate and retrieve digital data, information and content. To judge the relevance of the source and its content. To store, manage, and organise digital data, information and content.
- Communication and collaboration: To interact, communicate and collaborate through digital technologies while being aware of cultural and generational diversity. To participate in society through public and private digital services and participatory citizenship. To manage one's digital identity and reputation.
- Digital content creation: To create and edit digital content. To improve and integrate information and content into an existing body of knowledge while understanding how copyright and licences are to be applied. To know how to give understandable instructions for a computer system.
- Safety: To protect devices, content, personal data and privacy in digital environments. To protect physical and psychological health, and to be aware of digital technologies for social well-being and social inclusion. To be aware of the environmental impact of digital technologies and their use.
- Problem solving: To identify needs and problems, and to resolve conceptual problems and problem situations in digital environments. To use digital

tools to innovate processes and products. To keep up-to-date with the digital evolution.

The reason for the upgrade was that higher education teachers would require even more digital competences than other individuals. The ability of education to responsibly and creatively use digital technologies to collect information, communicate, create content, well-being, and solve problems is an important and complex task mentioned in DigCompEdu. Given its significance, we have included it below.

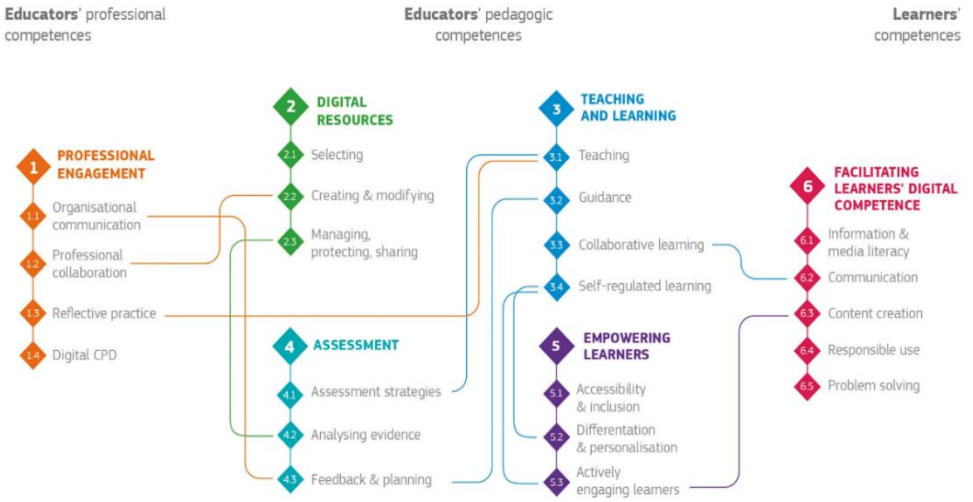
The European Framework for the Digital Competence of Educators (DigCompEdu) is a scientifically sound framework describing what it means for educators to be digitally competent. It provides a general reference frame to support the development of educator-specific digital competences in Europe. DigCompEdu is directed towards educators at all levels of education, from early childhood to higher and adult education, including general and vocational education and training, special needs education, and non-formal learning contexts. DigCompEdu details 22 competences organised in six Areas. The focus is not on technical skills. Rather, the framework aims to detail how digital technologies can be used to enhance and innovate education and training. The DigCompEdu study builds on previous work carried out to define citizens' Digital Competence Search for available translations of the preceding link (European Commission & EU Science Hub, 2022). It aims to help Member States in their efforts to promote the digital competence of their citizens and boost innovation in education. The framework is intended to support national, regional and local efforts in fostering educators' digital competence, by offering a common frame of reference, with a common language and logic (European Commission, Joint Research Centre et al., 2017). It responds to the growing awareness among many European Member States that educators need a set of digital competences specific to their profession in order to be able to seize the potential of digital technologies for enhancing and innovating education.

The DigCompEdu Framework aims to capture and describe these educator-specific digital competences by proposing 22 elementary competences organised in 6 areas (Figure 2: Area 1 is directed at the broader professional environment, i.e. educators' use of digital technologies in professional interactions with colleagues, learners, parents and other interested parties, for their own individual professional development and for the collective good of the organisation. Area 2 looks at the competences needed to effectively and responsibly use, create and share digital resources for learning. Area 3 is dedicated to managing and orchestrating the use of digital technologies in teaching and learning. Area 4 addresses the use of digital strategies to enhance assessment. Area 5 focuses on the potential of digital technologies for learner-centred teaching and learning strategies. Area 6 details the specific higher education teacher competences required to facilitate students' digital competence (European Commission, Joint Research Centre et al., 2017, p. 9). The core of the DigCompEdu framework is represented by areas 2 to 5, in which technologies are

integrated into teaching in a pedagogically meaningful way (Caena & Redecker, 2019, p. 363).

Figure 2:

The DigCompEdu Framework



Source: European Commission, Joint Research Centre et al., 2017, p. 10

On the one hand, the model represents the required digital competences of higher education teachers, and on the other, it enables additional tools to verify the development of own competences and potential approaches to improving various areas of digital competences. The model is complex, but it is intended to help an individual identify learning needs and define learning objectives as they progress. The "step-by-step" approach enables a higher education teacher to analyse and select the resources and activities that are most appropriate for them. Thus, the individual determines the current level of development of individual digital competences, as well as advantages, disadvantages, and areas for improvement. The Self-reflection on Effective Learning by Fostering use of Innovative Educational Technologies (SELFIE) was developed for self-assessment of digital competence development. It has two versions: one for teachers and one for schools. SELFIE for teachers (European Commission, 2022) helps the individual reflect on how they use digital technologies in their professional practice. On this basis, they can receive customised feedback with actionable suggestions for future development.

5. Case study of higher education teachers' digital competence development at the University of Ljubljana

The University of Ljubljana (UL) promotes digital competence development, responsible and safe use of digital technologies, and interaction with them in study, work, and social engagement. It recognises that digital competences are one of the key competences for individual lifelong learning, and that in order to appropriately transfer knowledge to students, it primarily requires higher education teachers with appropriately developed digital competences.

The case study is based on an examination of UL's activities in the field of developing digital competences in higher education teachers. Particular emphasis is placed on those aspects that have significantly contributed to the establishment of the current system. In addition to these examples, there are numerous other initiatives and activities, both at UL and among its members who have found a place in higher education practice in the field of digital competence development. They are not specifically mentioned because the content goes beyond the scope of this article.

The wider awareness of the importance of digitalisation and development of digital competences was presented by UL by joining the initiative "Slovenska digitalna koalicija – digitalna.si" in 2016 (Digitalna Slovenija, 2016, 2019). The initiative's primary objective was to use an open forum to discuss and actively direct Slovenia's digital development. The initiative is based on the idea that, with the accelerated development of the digital society, Slovenia will take advantage of the development opportunities provided by ICT and the Internet, becoming an advanced digital society and a reference environment for the introduction of innovative digital-technology-based solutions.

The Digital University of Ljubljana (2017–2020) project was the first institutional approach to modernising the pedagogical process with advanced technology (digitalisation) and finding an answer to one of the key challenges of higher education at the University of Ljubljana. With it, UL began to address one of the key challenges of modernising higher education: ensuring higher quality education through the implementation of innovative ICT-supported learning methods and approaches. The project's aim was to improve flexible forms of learning and teaching by incorporating the didactic use of ICT into the pedagogical process across all UL fields of study. UL recognised that in order to successfully integrate ICT into the pedagogical process with appropriate digital competences, higher education teachers and staff needed to be empowered (Jedrinović et al., 2020, p. 5).

The project's findings indicate that management and higher education teachers support innovative forms of teaching; however, due to a lack of guidelines and appropriate incentives, there are significant differences in the level of understanding and involvement of these methods, and thus in their contribution to teaching quality. As a result of the project, recommendations and guidelines aimed at teachers were

developed in terms of developing their digital competences. It has also led to the recognition that UL's innovative forms of teaching and learning using ICT will enable it to create the conditions for the education of critically thinking scientists, artists, and experts trained to lead sustainable development and with a developed responsibility towards fellow humans, communities, nature, and the wider society in a globalised and digitised world (Radovan et al., 2018, p. 5). In terms of the development of digital competences of educators, this is the first example of regulating the development of digital competences at the level of UL. It demonstrates that higher education teachers have gained access to the necessary professional and technical skills through developed solutions (materials).

Following the completion of the project, UL established the University of Ljubljana Centre for the Use of ICT in the Pedagogical Process (hereinafter referred to as the Centre). With it, UL continues its good practice in the field of education and dissemination from the *Digital UL* project (2017–2020), the *ICT project in the UL pedagogical study programmes* (2017–2018), and other projects, and provides education in the field of innovative didactic approaches using ICT, preparation of appropriate teaching materials, access to examples of good practices, and organisation of experience exchange between higher education teachers and colleagues (Center UL za uporabo IKT v pedagoškem procesu, 2022b).

The Centre provides activities for the development of digital competences in higher education teachers, individual counselling, multimedia and e-content production, support for the introduction and use of ICT, and active counselling to faculty leaders, teaching staff, and students, among other things. The Centre promotes the sustainability of more modern forms of learning and provides operational support in the development of general and digital competences in both higher education teachers and students. Activities are carried out in four thematic areas (Center UL za uporabo IKT v pedagoškem procesu, 2022b): teacher consultations, online workshops, live workshops and webinars, and materials.

Consultations with teachers aim to exchange good practices and experiences in the field of ICT use in the pedagogical process. Here are a few examples (Center UL za uporabo IKT v pedagoškem procesu, 2022a):

- Combined study in the post-Covid-19 period, where the consultation is divided into two parts. Foreign experts in the field of ICT use in the pedagogical process present their experiences and perspectives on learning and teaching in the post-Covid-19 period in the first part. The second part of the consultation will present examples of best practices for updating courses of study with ICT among UL higher education teachers.
- Exchange of experience with the use of ICT in the pedagogical process; "regular" dedications on the topic of exchanging good practices in the use of ICT in the pedagogical process, via the sharing of experience of UL higher education teachers.
- Examples of knowledge evaluation in distance studies; consultation focused

on demonstrating some of the possibilities for evaluating students' knowledge in distance studies through the use of ICT, as well as the limitations arising from the GDPR in the case of the use of ICT in the conduct of distance examinations.
- Providing an accessible learning environment for all students; the consultation focuses on presenting the possibility of providing an accessible learning environment for all students. It focuses on how higher education teachers can help make study materials more accessible by designing presentations and documents.
- Days of the UL Centre for the Use of ICT in the Pedagogical Process; the event focuses on the presentation of various possibilities for active participation of students using ICT in the pedagogical process both in classrooms and in combined study, distance study, and hybrid modes of study.

The online workshops are a central part of the Centre's activities. 24 online workshops are currently being developed to promote the didactic use of ICT among higher education teachers and UL staff. Workshops can be completed at their own pace, and a team of facilitators is always available to answer any questions. Workshops are divided into three types in order to best address the various needs of higher education teachers: (1) intensive online workshops (scope of activities: 16 hours, workshop duration: 1 month), which include a wider presentation of selected content, (2) focused online workshops (scope of activities: 8 hours, workshop duration: 14–16 days) – focused on individual segments of selected content of intensive online workshops and (3) classroom workshops (scope of activities: 4 hours on the same day) – intended for higher education teachers and colleagues who want to familiarise themselves with selected content in direct contact in the classroom or in support of work in online workshops. Currently, in May 2022, there are nine workshops (Center UL za uporabo IKT v pedagoškem procesu, 2022a), among which:

- Digital competences of higher education teachers: Participants in the workshop will learn about the extended core competences of the European DigCompEdu framework, as well as the model of advancement and the new SELFIEforTEACHERS tool for self-evaluation of ICT use in their own pedagogical practice.
- Learning analytics in ICT-supported environments: The workshop introduces participants to best practices and tools for analysing their own teaching and learning analytics opportunities in various learning environments that support the teaching process.

During the difficult situation with Covid-19, live workshops and webinars were replaced by webinars or virtual meetings in which current tools and their use in the pedagogical process were presented. There are nine current webinar topics, including "Advanced use of the Zoom videoconferencing system in the pedagogical process" and "Using the Mendeley automatic citation tool". There are currently 23 topics of focused

online workshops, including "Using the pedagogical wheel in planning learning activities for students" and "Using game elements within online learning environments". Workshops in the classroom are also returning following the cessation of measures due to the Covid-19 epidemic. Among the current topics, we can find 15 workshops, including "Creating interactive learning materials" and "Learning analytics in the Moodle web classroom".

The Centre regularly updates and adds new examples of good practice in the use of ICT in the pedagogical process, as well as various materials that can serve as a starting point for new ideas or answers to questions that may arise when using different ICTs, to the Centre's website. Currently, the following materials are available:

- Learning approaches, methods and forms of work: dichotomous key, documented problem solutions, concept mapping, student-generated test question, branching scenarios, key to class, guided note taking, dialogical teaching method, guided video viewing, pause procedure and think-pair-share.
- SAMR model.
- Materials in support of distance knowledge evaluation: guidelines for knowledge evaluation by ICT, examples of knowledge evaluation during distance learning, knowledge evaluation with Exam.net.
- Examples of good practice in the use of ICT in the pedagogical process; more than 50 examples of good practice have been prepared for various subject areas and are classified according to study areas, levels of ICT integration according to the SAMR model, exposed learning approaches, methods and forms of work, and ICT used.
- ICT toolbar with examples of ICT use in the pedagogical process, such as Exam.net, Formative, BookWidgets, Iorad, Screencast-O-Matic, Google Drive, Socrative, Quizizz, 1KA, H5P, Kahoot, Edpuzzle, Padlet, Geogebra, Trello, Moodle, Nearpod, Mentimeter, MS Teams and Zoom.
- Hints and tricks: more than 60 hints for using different ICTs, such as how to use ICTs to support collaborative project learning, interactive textbooks, table imaging tools, comparison of game making tools, creating a word cloud in the Mentimeter tool, …
- Frequently asked questions and answers, e.g. on the topic of user experience in working with Zoom, MS Teams, Exam.net, Moodle web classrooms, …

The Centre also holds consultations, such as the Digital UL consultation: the development of digital competences of higher education teachers, which aimed at exchanging experience and presenting pilot upgrades of subjects within the Digital UL project, as well as with the participation of representatives from the European Commission who participated in the development of a tool for self-testing competences for the higher education space within the Digital UL project (DigCompEdu).

Regarding the subject of this article, it is worth noting the intensive online

workshop Digital Competences of Higher Education Teachers – DigCompEdu, which aims to familiarise participants with the European Digital Competence Framework for Educators (DigCompEdu). It has 8 chapters in addition to the introductory and concluding sections. The participants are introduced to DigCompEdu and the self-evaluation tool SELFIEforTEACHERS before being given a presentation on all six areas of the European Digital Competence Framework for Teachers (DigCompEdu): (1) Professional development covering the following competences: organisational communication, management of online learning environments, professional cooperation, digital technologies and infrastructure, reflective practice, digital life, professional learning on digital technologies, computer thinking. (2) Digital resources covering the following competences: digital resource search and selection, digital resource creation, digital resource change, digital resource management and protection, digital resource sharing. (3) Teaching and learning covering the following competences: teaching, leadership, collaborative learning, self-regulatory learning, and emerging technologies. (4) Evaluation covering the following competences: evaluation strategies, evidence analysis, feedback, and planning. (5) Active student involvement covering the following competences: accessibility and inclusion, differentiation and personalisation, active student involvement, distance study, and combined study. And (6) encouraging the development of digital competences in students covering the following competences: information and media literacy, communication and cooperation, content creation, safety and well-being, responsible use, and problem solving.

During the workshop, participants are guided to reflect on their digital competences using extensive self-assessment tools. They learn about various digital technology teaching tools and strategies. They also learn how to use digital assessment strategies and tools to provide feedback and analyse their students' progress. Participants will leave the workshop with a comprehensive understanding of digital competences for teachers and the ability to design a personal learning pathway for the professional development of their own digital competences. They also know how to identify, modify and create appropriate digital resources. Attending the workshop requires no prior technological knowledge because the DigCompEdu framework focuses on non-technical skills and details on how to use technology to improve and innovate education at various levels.

In September 2021, the Institute of Multipliers for the Didactic Use of ICT was founded within the framework of the Digital UL. This is a community of university lecturers and UL staff who ensure the transfer of knowledge about the use of ICT in the teaching process in various formats. The activities of the multipliers deal with various issues related to the use of ICT in the work of educators, mostly at the level of the individual member (faculty). The activities take place both at the collective level (e.g. meetings of a large number of interested colleges, meetings, workshops on collaborative work of students in the e-classroom, review of the existing e-learning path in the online classroom, suggestions for improvement, support in working with

applications) and at the individual level (concrete steps, content, tools to increase the quality of work of HEI). Teachers participating in individual mentoring implement ICT updated activities and tasks with "mentoring" (multipliers are available for questions and individual support). The idea of the cooperation is also that the UL member institutions involved in the cooperation with the multipliers present their improvements and experiences in the courses of the faculty and thus contribute to the development of digital competences of education in the institutions.

In 2021, UL also started designing and developing an integrated learning environment for all UL members, lecturers and other UL staff. The integrated learning environment will include a series of interconnected web-based applications that support the delivery of the teaching process. In addition to online classrooms, the environment will include web applications supporting multimedia/video and various specialised applications linked to student information systems and single sign-on, providing access to all content and activities related to the study process in one place. In order to ensure the operational implementation of specific services related to the establishment of the Integrated Learning Environment, cooperation with the University Information Technology Service and the Integrators Group, which includes technical experts from individual UL members who have experience in the use of multimedia or, more generally, in the use of web-based ICT solutions in the educational process, or who have a special interest in this area and wish to contribute actively to the development of the Integrated Learning Environment, was strengthened in 2021.

On the one hand, the course of activities shows a great potential and awareness of the need to develop these topics. This is also confirmed by the data on the activities carried out (Jedrinović, 2022):

- Dissemination area: Teachers for teachers: 4 workshops, 336 participants; Website, FB, Instagram: 202 posts, 10,350 users, 27,300 views; Newsletter: 3 PubliKaTors, 395 users.
- Education area: Online workshops: 58 workshops, 254 participants; Live workshops: 113 live workshops, 2495 participants.
- Counselling area: Didactic counselling: 517 counselling sessions, 329 participants; Technical counselling: 122 counselling sessions, 113 participants.
- Area of research and development activities: Materials on the website: 256 materials, 27,300 hits on the website; Establishment and maintenance of online classrooms and integration with student information system for 6 UL members and UL Career centre.
- Pilot modernisation of course offerings with didactic use of ICT: Calendar year 2021: 36 course updates; Calendar year 2022: 39 course updates (additional applications possible); 22 of 26 UL members involved.
- Community of multipliers for the didactic use of ICT: 41 participants; 23 of 26 UL members involved.

- Community of integrators for the design of an integrated learning environment: 22 participants.

The activities carried out and the programme development show that the UL Centre for the Use of ICT in the Teaching Process is successfully fulfilling the basic task for which it was founded. It is about imparting didactic knowledge and supporting a quality pedagogical process through appropriate didactic methods and approaches and the innovative use of information and communication technologies, applications and services for all university teachers, students and staff at the University of Ljubljana.

6. Discussion

The technological advancement of society places new demands on the skills of higher education teachers, including the ability to manage the potential of modern ICT. New technologies that enter the higher education sector on a daily basis and are related to both professional areas and higher education pedagogy of student work play a significant role in improving or reforming higher education. As a result, in addition to professional competence in the field of work and work with students (higher education, didactics), the higher education teacher must also develop ICT competences.

The case study illustrates UL's awareness of the importance of the digital transformation of higher education to support the digital transformation of society. To this end, in 2016 UL joined an association (Slovenian Digital Coalition – digitalna.si) which (in cooperation with stakeholders from business, research and development, civil society and the public sector) aims to coordinate Slovenia's digital transformation in line with the adopted strategic documents "Digital Slovenia 2020". The promotion of digitalisation as a contribution to social development and the improvement of economic performance, employment opportunities, quality of life and social inclusion has made it necessary for UL to define the "content" of digitalisation. This is content that is both "technical" and educational in nature and internationally comparable.

Several (international) documents identify the needs for ICT-related knowledge and digital competency, ranging from the EU's key competences for lifelong learning to the digital competences of higher education teachers. Simultaneously, numerous educational theories and perspectives explain why the use of ICT in higher education is essential. The socio-cultural perspective and connectivism are highlighted. The socio-cultural perspective assumes that our knowledge of the world is not found in the objects or events themselves, but rather in our discourses and tools (artifacts). Knowledge is made up of external and internal constructs that are linked to the social world around us as well as the individual's world. According to the socio-cultural perspective, social practices necessitate their own higher education pedagogy in order for us to maintain and transfer our complex knowledge of the world. Our physical and communication experiences have resulted in the management of today's intellectual

and physical artifacts (Säljö, 2005; Wertsch, 2002).

As a result of the advancement of ICT, learning will increasingly focus on mastering new technology in its various forms. Rather than learning how to memorise information, we must learn how to transform it into knowledge.

The second aspect is connectivism. The basic idea of connectivism (Siemens, 2005) is that learning occurs in networks in which the individual is involved, rather than within the individual. Networks can consist of different individuals and computers. According to connectivism, learning occurs when we see or discover a new connection in what we read. The Internet and Web 2.0 technology enable students to participate in the creation and dissemination of information, emphasising the significance of non-formal learning, or what students learn outside of the formal higher education process.

The case study shows that UL has pursued both aspects in the digitisation process. First with the Digital University of Ljubljana project, which, based on theoretical findings, policy guidelines and best practices, investigated the requirements, needs and possibilities of integrating the didactic use of ICT into the pedagogical process. Lessons learned from the project, and in particular from the Covid 19 crisis, have accelerated staff and student empowerment activities, with a particular focus on teachers. In this context, experience in relation to self-assessment of digital literacy development shows that the focus is often only on "technical" mastery of a particular ICT tool (e.g. Zoom, MS teams, exam.net) and the requirements of digital literacy models (e.g. DigComp 2.0, DigCompEdu).

The above findings highlight the need to develop digital competences across multiple categories, which UL has done on a larger scale by offering various training, counselling and mentoring programmes (setting up multipliers). Based on the literature and the case study, we believe that the following categories need to be addressed in the process of digital development of HEI teachers:

- Theoretical knowledge: knowledge of information technology, teaching and learning, understanding the interaction between learning and technological support, knowledge of the ability to use the appropriate ICT tool when working with students. This also includes (non-)formal pedagogical competence.
- Technological competency: involves the use of digital tools and media. It focuses on understanding the various functions of digital tools and media, as well as how to adapt to digital tools and deal with the various complications that may arise during their use.
- Practical skills: the ability to practice the use of ICT. It refers to a logical approach to obtaining, managing, preparing, processing, and storing information. It is also referring to the ability to describe the process and develop the workflow. It is useful in searching for information in different databases using different search tools and in using different ICT tools for presentation, communication, and reporting within the subject.

- Interactive skills; ability to use different learning platforms to communicate, inform, discuss and collaborate, and to engage in different expert groups and networks.
- Reflexive skills: the use of ICT and Internet access presents a number of challenges that a higher education teacher must be able to evaluate critically. You need to know the advantages and disadvantages of the Internet as a source of information, as well as the potential risks associated with the use of ICT, the Internet, and electronic communication (credibility and reliability of available information).
- Cognitive skills include information management, innovation, content evaluation, and problem-solving. Information management includes access to information, identifying and organising it, developing critical thinking skills, and innovative action. It is about being able to create new content with digital tools and media, as well as solve problems and think creatively.
- Legal issues; ICT raises new issues relating to the legal aspects of the work of a higher education teacher (copyright, personal data, digital cooperation rules, …).
- Ethical competence; the ability to communicate and share information in a digital form in a respectful and responsible manner, to take responsibility for publishing content, and to be aware of the impact of such content.

Categories do not exclude one another, and they best contribute to achieving the expected level of digital competence development. According to experience, the user aspect of ICT receives the most attention in practice, which refers to theoretical knowledge and practical skills, as well as technological competence. The other categories are given far less weight. This means that there are still many challenges to overcome in the process of developing higher education teachers' digital competences. It is true that practical skills in the use of ICT are critical, but it appears that too many higher education teachers are satisfied with practical skills, search techniques, and a focus on a very narrow range of ICT tools. Furthermore, the practical application of ICT is inextricably linked to the opportunities and risks of electronic media communication and Internet use. This includes the credibility of the information sought (e.g., novelties, case studies, teaching materials, support for teacher work) and received (e.g., plagiarism detection), which relates to both legal and ethical knowledge on the use of ICT.

To use ICT in teaching, higher education teachers must consider how ICT can help the educational process. It is not enough for a higher education teacher to focus on the "formal" development of digital competences in accordance with the profession's "highest" criteria (e.g., DigCompEd), but he must also consider the fact that his digital competences "live" in his work with students. We also refer to the interaction between digitalisation and socialisation, which is "blurred" in many studies because it relies too much on the experience of the Covid 19 crisis. The problem is that this was not a carefully planned and gradual change, but a sudden change in learning

methods. Fully digital education went hand in hand with complete closure, so that opportunities to socialise became very limited and/or restricted to the online space. Nevertheless, they highlighted important aspects of digital education that are closely linked to socialisation and that also need to be carefully considered from the perspective of the future of higher education (Fűzi et al., 2022, p. 504).

Given the anticipated digital transformation of society, higher education institutions (universities) should prioritise the development of digital competences among higher education teachers over other development priorities. Perhaps also in such a way that, in addition to achieving research excellence in the career process of a higher education teacher, they would pay more attention to higher education teachers' pedagogical competence, including the development of digital competences. In addition to lifelong learning in this field, candidates should be given the opportunity for such development, particularly when "entering" the higher education system, and formal evidence (e.g. accumulated credit points in the field of pedagogical education, which would include the development of digital competences) would also be required for employment in this field. Furthermore, it appears reasonable to devote more attention in the future to staff development, which would ensure meaningful selection (transparency, usability, licenses) and integration into each institution's environment, as well as professional support in the introduction or transfer of knowledge regarding the management of that technology to higher education teachers. Only institutional conviction of the need to exploit the boost of the digital revolution and the solid commitment of students, professors, researchers, staff and managers, will allow the university to be successful in the digital era (Kaputa et al., 2022, p. 65).

This case also shows that institutional support, collaboration between higher education teachers with different profiles of experts in higher education and ICT, collaboration with professional colleagues, even beyond the boundaries of their department and institution, is a good starting point for the development of digital competences among higher education teachers. It is particularly beneficial when students participate in this collaboration. Therefore, more space should be devoted to this "concurrent" education in the future. This collaboration's experience can help higher education teachers develop their digital skills and take responsibility for their own development. All of this enables higher education teachers to provide students with the knowledge they require in today's global information society.

7. Conclusion

The advancement of scientific fields, technological advancements, and social development all have an impact on expectations for "new" pedagogical capabilities of higher education teachers, particularly with regard to the use of digital technology. Digital technology and related services are constantly changing. To avoid digital exclusion, higher education teachers must develop digital competences in tandem with

technological advancement. As digital tools become more widely available, students' expectations for their use in the learning process rise. We are saying that digital competence is becoming an increasingly important skill for higher education teachers, but that teachers who lack digital competence risk gradually drifting away from professional development requirements. Digital competences are also required for participation in the academic community and the completion of various tasks, such as information and data management, content preparation, communication, etc.

Higher education teachers must keep up with the rapid digital development of education. As a result, the list of competences that the teacher must possess is always growing. This is followed by UL's activity in the area of institutional support for the development of digital competences of higher education teachers. The University of Ljubljana's Centre for the Use of ICT in the Educational Process is the focal point in this context. The Centre offers continuing professional development as well as direct advice to higher education teachers and staff on the didactic and technical use of ICT. Furthermore, it monitors national and international trends in the use of ICT in education and translates them into UL practice through collaboration in the renewal and updating of study programmes and the development of digital competences. All of this is done to improve higher education teachers' digital competences so that they can effectively integrate digital technology into teaching and learning. Digitally competent higher education teachers will always use pedagogical considerations when selecting digital tools and resources, rather than the other way around, knowing that it is teaching and learning that are at the forefront, not tools. As a result, higher education teachers are among the most important factors for successful digitalisation, which will provide quality higher education in the future. Technology will never replace excellent higher education teachers, whether they are excellent or not: any higher education teacher who can be replaced by a computer deserves to be replaced.

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