

SECTION 4. INFORMATION AND COMMUNICATION TECHNOLOGIES IN EDUCATION

4.1 Digital competencies of a teacher of a higher technical educational institution

The modern concept of industrial development "Industry 4.0" or "new industry" is closely related to the formation of the so-called electronic or digital economy. One of the most important areas is education and training for the digital economy, the development of a knowledge society, raising awareness and digital literacy. The digital economy faces a difficult task - to move to a new level of the economy, where in most development sectors, including the educational sphere, information and telecommunication technologies will be actively used, allowing you to actively work in the information field for more effective learning and development of students.

Currently, digital technologies are widely used at all levels of education and are effectively used in solving a lot of methodological problems (training, demonstration, modeling, educational games, etc.).

The effective development of education should be aimed at the formation of a competitive human potential. Particular importance is attached to the development of the competencies of teachers and leaders, allowing them to master new programs and methods of working with students. The level of professional competence of a university teacher determines the quality of training of future specialists, and is one of the conditions for ensuring the competitiveness of a higher educational institution. Real changes in the process of training highly qualified specialists in the light of modern requirements are possible only if the professional competence of the teacher of higher education is developed, who is aware of the measure of his responsibility to students, himself and society.

Pedagogical activity is multifaceted and complex, which requires the teacher to have a high degree of formation of various types of competencies - pedagogical, subject, cognitive, etc. Modern realities add digital skills to the model of teacher competencies. The use of digital resources and technologies in pedagogical practice is

now not only desirable, but a necessary element. However, the rate of development of digital technologies is significantly ahead of the rate of professional development of teachers. In this regard, the development of a model of digital competencies of a modern teacher seems to be an urgent task and is being carried out by various expert and scientific communities.

Digital competencies include:

1. Competence in the field of information search on the Internet.
2. Competence in the use of mobile communications.
3. Competence in the use of social networks.
4. Competence in the field of conducting financial transactions via the Internet.
5. Competence in the field of consumption of goods and services via the Internet.
6. Competence in the field of critical perception of information and verification of reliability.
7. Competence in the production of multimedia content for the Internet.

The European Union has developed its own digital competency assessment system, published in 2017 “DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use” (DigComp) [103]. According to these recommendations, there are eight levels of implementation of digital competencies for all citizens that are necessary at work, for personal development and social adaptation. DigComp recommendations distinguish five groups of digital competencies:

1. Information literacy and ability to work with data.
2. Communication and collaboration.
3. Creation of digital content.
4. Safety.
5. Problem solving.

In each group of competencies, several competencies are allocated - from three to six, twenty-one competencies in total. DigComp distinguishes eight levels of competence expression, grouped into four groups, which depend on:

- complexity and complexity of the task - from simple to complex and uncertain;

- independence in solving problems - with a textbook or instructions, on your own, helping others, offering new approaches to solving a problem;
- dominant cognitive area - remembering, understanding, applying and creating.

It should be noted that attempts to build a model of digital competencies of a teacher have been going on for a long time. The most complete model of teaching competencies can be called the TechnologicalPedagogicalContentKnowledge model - TRASK. It describes competencies in three key aspects for a teacher - technology, pedagogy and content [104]. This model describes the competencies and knowledge of the teacher, which are necessary for him to integrate technologies into the educational process, regardless of the discipline being taught (Fig. 1).

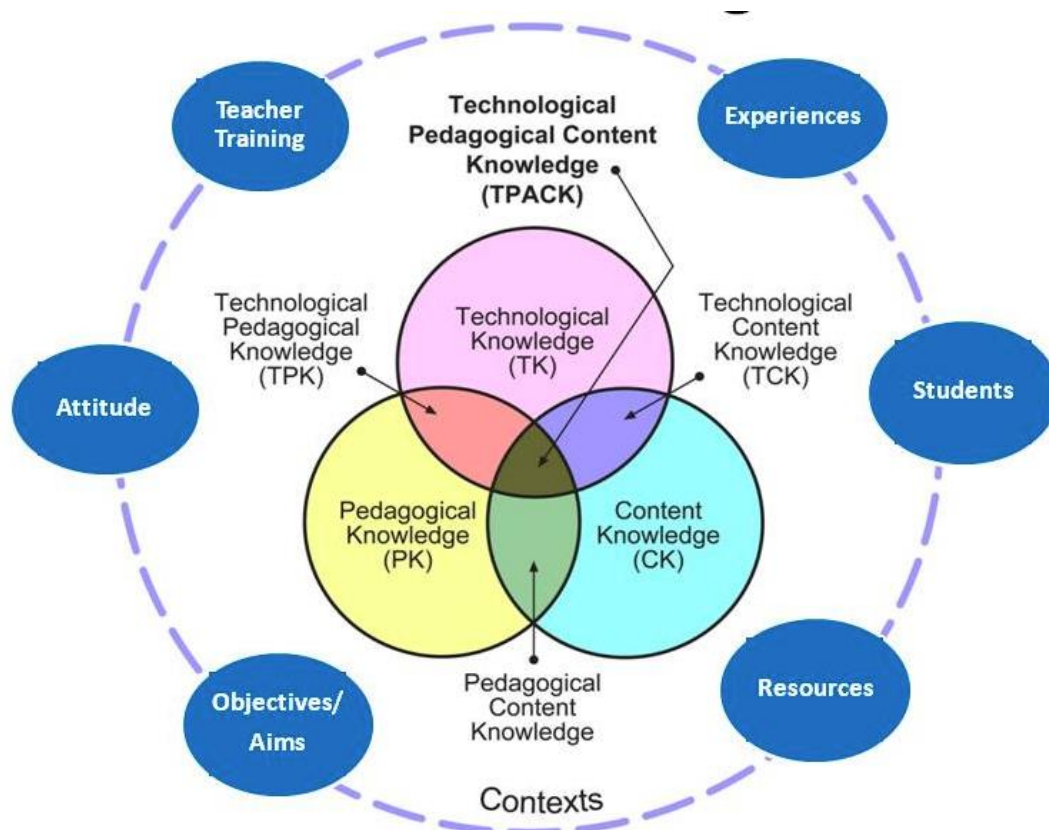


Figure 1. Components of the TRASK model [105]

Technological competencies in this model include the ability to use various technologies from low-tech (pen and paper) to digital (Internet, digital video, interactive whiteboards and software). Digital technologies according to this model include the following [104]:

- ability to solve own technical problems;
- knowing how easy it is to use technology;
- keeping track of important technological innovations;
- frequent training to improve skills in working with technology;
- knowledge of a large number of different technologies;
- availability of technical skills necessary for the use of technology;
- sufficient experience in working with various technologies.

It should be noted that many models for evaluating the competence of a teacher as a whole have been built on the relationship between the technical, pedagogical and content competencies of a teacher. In particular, the UNESCO recommendations on the structure of ICT - the competencies of teachers. These recommendations propose a competency framework consisting of six modules and three approaches [106]. Modules can conditionally be called groups of competencies, and approaches - the degree of their severity. So, the first module - "Application of ICT" - the ability of the teacher to apply technologies himself and help students use them; the second module - "Knowledge Mastering" - the use of technology to solve complex problems; in the third module "Knowledge production" new knowledge is produced using technologies (Fig. 2).

These recommendations are aimed more at the use of technology in the organization of the educational process than at identifying the competencies of the teacher himself. Having considered the models of digital competencies of a teacher, we can conclude that the competencies of a teacher are a complex phenomenon. Along with a high level of digital competencies, a modern teacher should express subject, pedagogical competencies, as well as communicative and other cross-border competencies. In this regard, the blueprint of the European model of digital competencies for education, presented in fig. 3.

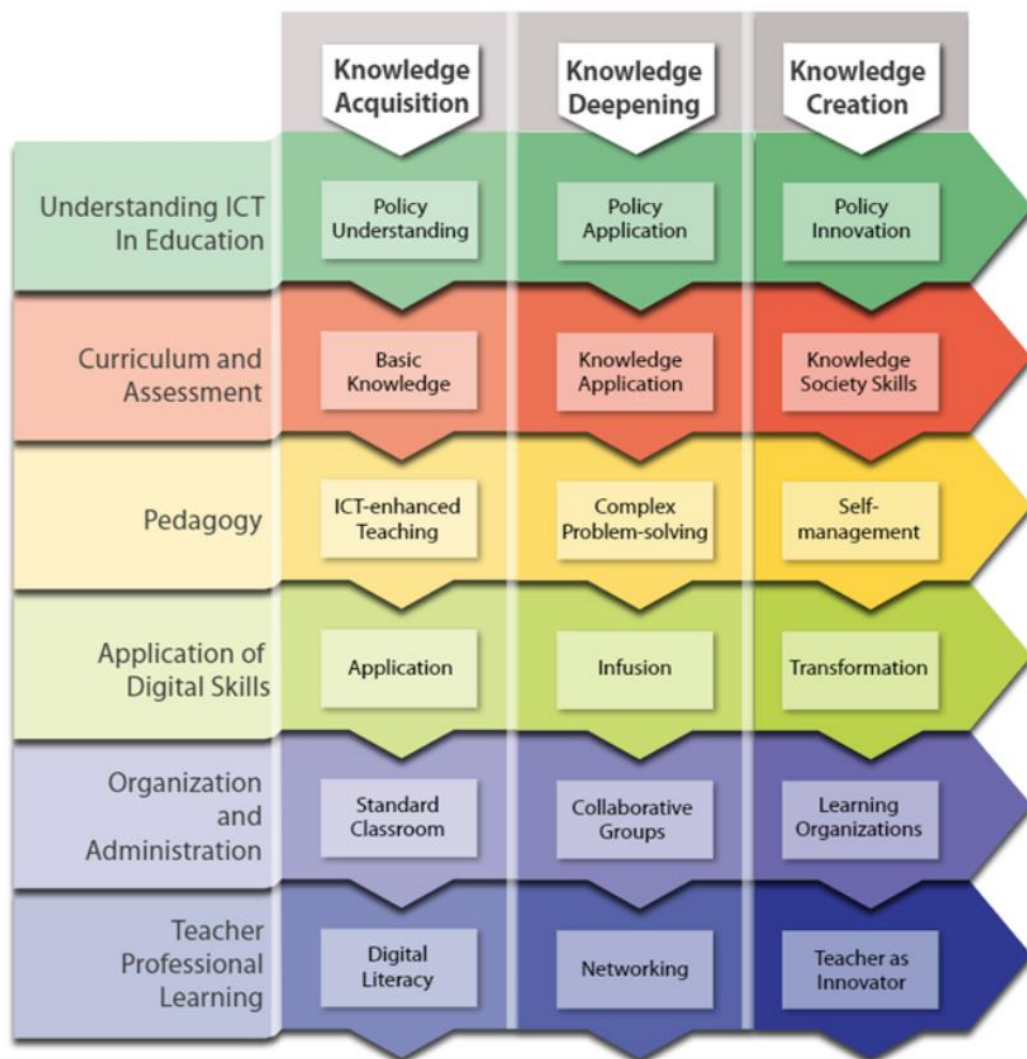


Figure 2. The UNESCO ICT Competency Framework for Teachers

According to the European model, digital competencies are aimed at:

- to improve the use of digital technologies in teaching and learning;
- development of skills necessary for digital transformation;
- reliance on analysis and forecasting based on data in education.

As can be seen from fig. 3, the teacher is required to express the following types of competencies:

- professional competencies that provide professional interaction between the teacher and the student;
- digital competencies, which are a condition for the effective implementation of digital resources in the educational process;
- pedagogical competencies, including the processes of using digital resources, as well as teaching, assessing and empowering students using digital resources;

- cross-border competencies, consisting of “soft” skills, allowing to move from the delivery of knowledge to the promotion of the development of digital skills of students;
- subject competencies, which are the basis of this model.

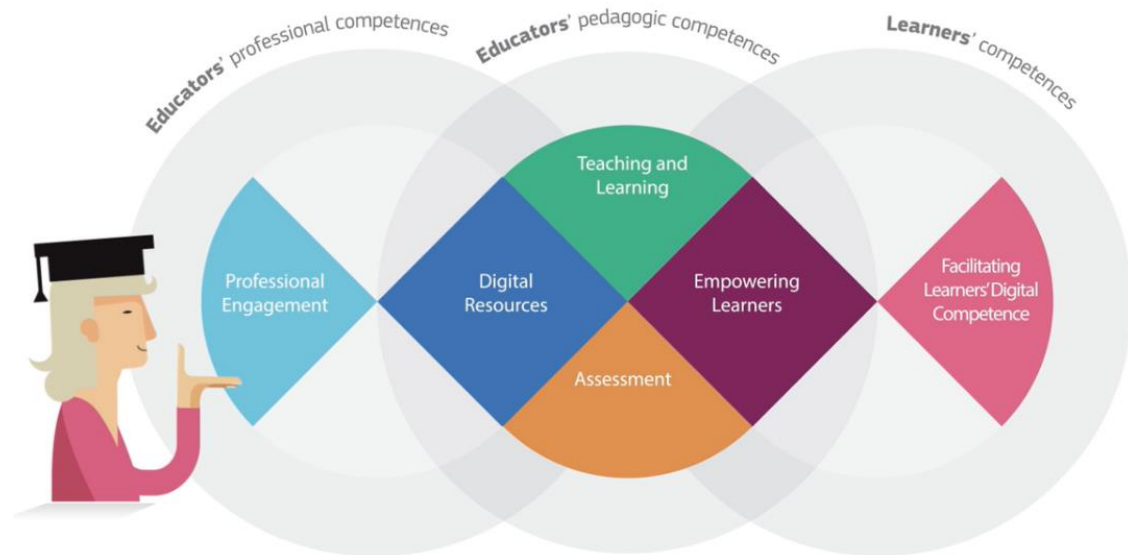


Figure 3. Plan - scheme of the European model of digital competencies for education [106]

Thus, it can be noted that this model is complex and affects all aspects of teaching as a systemic and multifaceted process. Based on this model, it is possible to develop a system for assessing the formation of digital competencies of a modern teacher and certification of teachers in terms of digital competencies necessary for pedagogical activity.

Total digitalization generates the need for new models of organizing the educational process, providing students with fundamentally new development trajectories, which, in turn, leads to the complication of pedagogical activity and the transition to learning in a branched digital ecosystem that helps the teacher successfully solve new problems. An analysis of the studied approaches to assessing the digital competencies of teachers shows the need to create a comprehensive support system for teachers, which includes various elements of a competency model and is focused on

supporting the teacher in the process of solving problems of professional and personal growth.

The formed information competence allows the teacher to independently search for information to increase the level of knowledge, analyze, select the necessary, transform, store and distribute it in the information field.

The use of information and telecommunication technologies in the educational process makes it possible to implement innovative educational technologies based on new teacher competencies, which include information and digital competencies. Digital competencies should be understood as the skills and abilities of a teacher to confidently, effectively, safely select and apply information and telecommunication technologies in solving professional problems.

Digital competencies in teachers can be best formed if they cooperate with each other to implement joint educational IT projects. The greatest interest among teachers in this matter is the use of feature films and social networks in teaching. Also, the attention of the leadership of the educational institution has a significant impact on the development of new competencies, that is, the more “advanced” the rector of the university, the faster his subordinates master ICT. An important role in the development of media competencies of teachers is played by the practice of interuniversity cooperation in the network. The popularization of advanced teaching methods in the form of a public database will stimulate a better transformation of the educational process. Teachers will be inspired to use IT technologies in lectures and practical classes, and will also be convinced of their “usefulness” when used in the educational process with colleagues.

The use of ICT in the didactic process is a necessary element in the competencies of a modern teacher. IT-technologies give teachers diagnostic tools and will significantly optimize the educational process. If a person actively uses modern technologies in his daily life, this does not mean that he will use them in teaching. The level of ICT use in higher education is insufficient. Therefore, teachers should improve the practical use of ICT in teaching students. Today, the level of technological maturity is an indicator of their professional competence. ICT will never replace a teacher, they

can only be one of the tools that he uses in his work. Attachment of teachers to traditional lectures and seminars, insufficient support for their ICT training leads to the fact that ICT becomes a superficial didactic supplement. This means increasing the distance between the university and the real life of young people in the era of the digital world. Therefore, an advanced level of ICT use is, first of all, the foundation of modern education.

Changes in the competencies of teachers, due to the new conditions of pedagogical activity, electronic channels of communication with students, the need to use advanced digital technologies, are also characterized by universality, regardless of the names of competencies adopted in a particular pedagogical system. Such a global nature of the actualization of a number of competencies suggests that during the pandemic, teachers of higher education underwent a transformation in their pedagogical culture. The "electronic" pedagogical culture, manifested among teachers as a result of concentrated efforts of flexibility of thinking, innovation, creativity, entrepreneurship in a stressful situation, has found its expression in new models of strategic planning and management of the educational process.