

# Use of Digital Educational Resources in the Training of Future Specialists in the EU Countries

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## Summary

The article proves that the main goal of informatization of higher education institutions in the EU countries is to improve the quality of education of future specialists by introducing digital educational resources into the education process. The main tasks of informatization of education are defined. Digital educational resources are interpreted as a set of data in digital form that is applicable for use in the learning process; it is an information source containing graphic, text, digital, speech, music, video, photo and other information aimed at implementing the goals and objectives of modern education; educational resources on the Internet, electronic textbooks, educational programs, electronic libraries, etc. The creation of digital educational resources is defined as one of the main directions of informatization of all forms and levels of Education. Types of digital educational resources by educational functions are considered. The factors that determine the effectiveness of using digital educational resources in the educational process are identified. The use of digital educational resources in the training of future specialists in the EU countries is considered in detail. European countries note that digital educational resources in professional use allow you to implement a fundamentally new approach to teaching and education, which is based on broad communication, free exchange of opinions, ideas, information of participants in a joint project, on a completely natural desire to learn new things, expand their horizons; is based on real research methods (scientific or creative laboratories), allowing you to learn the laws of nature, the basics of techniques, technology, social phenomena in their dynamics, in the process of solving vital problems, features of various types of creativity in the process of joint activities of a group of participants; promotes the acquisition by teachers of various related skills that can be very useful in their professional activities, including the skills of using computer equipment and various digital technologies.

## Keywords:

*digital educational resources, training of future specialists, EU countries, tasks of informatization of Education, types of digital*

*educational resources by education functions, factors that determine the effectiveness of using digital educational resources in the educational process.*

## 1. Introduction

Informatization of society, which took place at the end of the XX century, is characterized by the mass introduction of information technologies in all spheres of human life and activity. Information is an integral attribute of human life. One of the determining factors of the turn to the highly organized stage of civilization can be considered the process of informatization of society.

Informatization of society has a decisive impact on the development of the economy, the growth of science and the improvement of material and spiritual production, and Information Technology, which creates the basis for informatization of society, allows you to automate many spheres of human activity, while being the defining and core for the entire system of modern technologies.

The main task of informatization of education is to create a certain information base, which includes:

1. Information base: Universal Information Processing Tools, general methods of solving information problems, methods of using information and communication technologies in education.

2. Material and technical base, its basis is computerization: audio, video, multimedia, cloud technologies, telecommunications.

3. Scientific and methodological: use of ICT in educational activities; creation of digital educational resources.

The main goal of informatization of higher education institutions is to improve the quality of education of future specialists by introducing digital educational resources into the educational process [7; 10].

**The purpose of the article:** to find out the specifics of using digital educational resources in the training of future specialists in the EU countries.

## 2. Analysis of recent research and publications

I. Gevko and A. Drobina set the main goal of informatization of higher educational institutions and define the main tasks of informatization of Education [7; 10].

A. Yatsishin considers the digitalization of education to be one of the most important conditions for the successful development of the processes of digital transformation of society [27].

Kotiash, I., Shevchuk, I., Borysonok, M., Matviienko, I., Popov, M., Terekhov, V., Kuchai O. tells that the multimedia technologies must meet the goals and objectives of the course and be an integral part of the learning process. The practice of multimedia technologies in the educational process of higher education institutions allows to move from a passive to an active way of implementing educational activities, in which the student becomes the main participant in the learning process. [14].

Shunkov, V., Shevtsova, O., Koval, V., Grygorenko, T., Yefymenko, L., Smolianko, Y., Kuchai, O. study the direction of development that is recognized as the main one in the course of reforms of educational systems in the leading countries of the world - the USA, Great Britain, Canada, Germany, France, etc. The main task of the reform process is to train the staff needed by society in the right amount, in the minimum time and with minimal costs. It was found that a promising area is the use of multimedia technology in educational activities to create a design of a virtual computer environment by means of digitizing audiovisual information. The purpose of the application of multimedia technologies of education in higher education institutions is to prepare students for full-fledged life in the information society [22].

Kuchai, O., Skyba, K., Demchenko, A., Savchenko, N., Necheporuk, Y., & Rezvan, O. examine the role of multimedia education in the evolution of the information society. The information range is skilled both as a separate sector of the economy and as a factor in the modernization of education [15].

## 3. Research methods

The article uses theoretical research methods – analysis and systematization of philosophical, sociological, psychological and pedagogical literature on the research problem in order to determine the main and clarify the

essence of key concepts; synthesis, comparison, classification, generalization and clarification of the features of digital educational resources in the training of future specialists in the EU countries.

## 4. Results and discussion

Digital educational resources is a set of data in digital form that is applicable for use in the learning process; it is an information source containing graphic, text, digital, speech, music, video, photo and other information aimed at implementing the goals and objectives of modern education; educational resources on the Internet, electronic textbooks, educational programs, electronic libraries, etc. [8].

The creation of digital educational resources is defined by scientists as one of the main directions of informatization of all forms and levels of Education. The development of the information services industry in the field of Education, which includes the production of digital educational resources and software and methodological support, along with the creation and development of telecommunications structures of individual educational institutions and the industry as a whole, education quality control systems forms the basis for the formation of the infrastructure of informatization of Education. Digital educational resources are the most important component of all areas of activity of a modern teacher, which contributes to the optimization and integration of academic and extra-curricular activities [28].

Let us consider the types of digital educational resources by educational functions. An important feature of digital educational resources is interactivity, that is, the possibility of dialogue, feedback, which allows for repeated access to the material, forms of control, which ensures an active student in the educational process, stronger assimilation of knowledge and consolidation of them in skills. Traditionally, this possibility existed only in the case of direct contact between the teacher and the student. Interactivity implies the actual possibility of creating the most individualized educational complexes focused on maximum optimization of the educational process. Many educational and encyclopedic programs are based on the principle of hypertext markup of the material, which allows the student to independently build the learning process.

Testing systems that are part of digital educational resources are used to organize forms of control. The testing system can be integrated into an electronic textbook, but it can exist as an independent element. As a module of an electronic textbook, the testing system allows you to identify gaps in knowledge and helps to eliminate them.

When using digital educational resources, teachers get the opportunity to individualize the learning process of each student, providing independence in the search and selection of information resources, in working on projects of interest

to them. The ability to collaborate and cooperation increases the motivation for their cognitive activity in groups and individually. Joint work encourages them to be acquainted with different points of view on the problem under study, to search for additional information, to evaluate their own results. Digital educational resources allow students to independently form their own view of events taking place in the world, be aware of many phenomena and explore them from different points of view. These are elements of global thinking and understanding of the commonality of human existence and the evolution of development.

The global integration of digital educational resources into education is a new approach to obtaining knowledge, specialty, profession, which is still poorly studied, but undoubtedly carries a huge pedagogical potential.

The effectiveness of using digital educational resources in the educational process largely depends on a number of factors: on the reliability and capabilities of the equipment used, software tools; on the true interest of the participants of the joint project in the chosen topic; on the possibility and ability to use remote information databases; on the ability to work at a computer; on the practical implementation of the results obtained; on the motivation of students to use digital educational resources [4].

It is well known that the use of digital educational resources in European countries is represented at the highest level. European higher education institutions play a key role in preparing students to meet the demands of an increasingly technologically advanced world.

In Europe, education systems have been designed to integrate digital learning platforms and tools for teaching and learning, recognizing the potential benefits of new technologies and digital learning environments that have become an integral part of everyday life. Europe needs new visions of modern higher education in the digital age. Digitalization is not only an additional challenge, but also an effective means of solving key problems of higher education in the XXI century [26].

The final communique of the Paris Ministerial Conference also put a new emphasis on the possibility of digitalization of Education: "Digitalization plays an important role in all areas of society, and we recognize its potential to change the way higher education is provided and how people learn at different stages of their lives. We encourage our universities to prepare their students and support their teachers for creative activities in a digital environment. We will enable our education systems to make better use of digital and blended education with appropriate quality assurance to improve flexible lifelong learning, develop digital skills and competencies, improve data analysis, educational research and forecasting, and remove regulatory barriers to providing open and digital education." [20].

The Digital Education Action Plan is a key factor in implementing the vision of achieving the European

educational space by 2025. It contributes to the achievement of the goals of the European Skills Plan, the European social level Action Plan and "the Digital Compass 2030: the European path for the digital decade."

The Digital Education Action Plan is a renewed policy initiative of the European Union (EU) that defines a common vision of high quality, inclusive and affordable digital education in Europe and aims to support the adaptation of education and training systems of member states to the digital age. The Action Plan is a call for greater cooperation at the European level in the field of digital education in order to overcome challenges and opportunities, as well as present opportunities for the educational and professional community (teachers, students). Politicians, academics, and researchers at the national, European, and international levels.

The initiative promotes the Commission's priority of "Europe fit for the digital age" and the next-generation EU. Recovery and Sustainability Fund, which aims to create a greener, digital and more sustainable European Union [5].

Let us take a closer look at the use of digital educational resources in the training of future specialists in the EU countries.

In Romania, digitalization of higher education is one of the strategic goals that uses the successful models of other states that have already passed this process. On a global scale, the economy and society will depend on technologies that simultaneously support and finance digital innovation. Progress in the digital sphere in Romania has brought new challenges for students and teachers [12; 16].

The integration of Higher Education in Romania into the digital age requires the successful implementation of aspects related to:

- providing free access to educational resources, including through the introduction of online platforms and learning tools, facilitating the learning process and being as accessible and easy to use as possible. An example in this sense is online libraries, which can be used to implement various alternative teaching methods, as well as other tools that can increase the degree of trust between students and teachers and the transparency of the assessment process. At the same time, it becomes possible to create an inclusive environment for different categories of students, for example, students with disabilities or adults, encouraging the development of the international dimension of Higher Education.

- de-bureaucratization by digitalizing administrative processes within the higher education institutions. Digitalization represents components that facilitate an important part of the processes of the current educational system and improve students' lives during their studies. One of the most important aspects is to simplify the processes of entering the Institutions of higher education, living, paying taxes, etc., by implementing them online. Digitalization can also be a mechanism for implementing student-centered

education, which also facilitates communication between students and the teaching staff. Unfortunately, digitalization is still a poorly implemented process at present, and one of the main obstacles to integrating such measures is the adaptation of administrative and support personnel.

- implementing the online platform Unified Register of Maturity, it is necessary to monitor the educational trajectory of students, allowing access to data that can be used to create an overall image of the higher education system, develop medium - and long-term strategies that can reflect its constant evolution.

Therefore, using online platforms, it will be possible to study online, implement mixed mobility, virtual campuses and exchange best practices between universities at all levels, as well as have more effective cooperation in education and training. Therefore, the goal of Romania's higher education strategies in the digital age should not be to provide digital services, but to improve and introduce innovations in teaching and learning through digitalization [3].

Digitalization of the Hungarian Higher Education sector focuses on digital readiness by studying the digital practices of students and staff of higher education institutions.

Readiness for digital education in Hungary has two dimensions: 1) the level of access and suitability of digital technologies and content available to directors, managers and administrators of Higher Education, academic staff and students; 2) public policy that sets priorities and incentives for higher educational institution to implement digital practices in its main activities, as well as institutional strategies that strengthen the ability and motivation of teachers, administrators and students to implement digital practices [11].

Digital educational resources in Hungary include hardware and software used for teaching and learning, as well as data systems that provide information about digitalization of processes in higher educational institutions. In Hungary, most students enter Institutions of higher education equipped with various ICT tools. Hungary has a well-developed higher education administrative data system, especially the Higher Education Information System (FIR), which provides a national view of the system from applying for admission to higher education to graduation. In addition, the country is innovating to link higher education data at record levels to other government data systems, such as tax and social assistance systems, to create a graduate tracking system. A digital resource has been created that provides Hungary with a powerful tool for analyzing and mapping student performance and post-school outcomes. There are a number of additional areas where there are opportunities to improve the digital infrastructure of higher education in the country: access to technology for all students, access to relevant technologies, and the ability of higher education institutions to support the

effective development and use of digital infrastructure [17; 23; 24].

In a recent report, the Dutch Education Council said that in the era of rapid digitization, the education sector is still looking for an appropriate level and appropriate digitization methods. The board has made the following recommendations: reduce the burden on the education sector by guaranteeing the technical background and privacy aspects of digitalization; increase the sense of ownership of digitalization in the education sector; and explore digital applications for experience creation and development.

Dutch universities share the view of the Education Council that digitalization also has a significant impact on academic education. Digitalization is relevant for all aspects of academic education. This affects the logistics of education, teaching methods, and skills required by graduates in a rapidly changing labor market, which means that it also affects the content of curricula.

In Dutch education, digitalization has already enriched the educational material and new teaching methods are being used. While developments in learning analytics and digital learning methods will not restore the master-intern relationship, they promote personalized learning that takes more into account the student's personality. With concepts like changing classrooms and blended learning with a mix of online and offline courses, there is more room for interaction between students and teachers.

As educational institutions increasingly offer online courses, students have more options where to choose. Without leaving the country, they can get information or take courses at other universities [13; 16].

Dutch Universities aim to create a leading nation in digital technologies focused on people and society. The Netherlands owes to its unique position in the digitalization of higher education to the fact that Dutch Universities have made joint long-term investments in both hardware and software for the digital backbone over the years.

The Netherlands identifies ten points of opportunities for digitalization of Education:

1. An "experimental period" during which they explore what works and what does not, what progresses, and what expands successful pilot projects.

2. Strengthen graduates' digital skills. This includes basic ICT knowledge, information literacy, and computing skills, the exact content of which will vary depending on the degree program. Given the scale of the Dutch higher education sector, upgrading curricula and adapting the range of degree programs to offer graduates optimal opportunities is a relatively clear process. At the national level, agreements can be made on the digital skills required for graduates. It would be logical to include this in the initial qualifications of the curricula.

3. In addition to digital skills, you should also pay attention to the digital sustainability of students and the

ethical issues of digitization. Because universities play an important role in protecting an open liberal society, they are fully aware of both the strengths and weaknesses of the Internet and digitization.

Especially in the digital age, academic skills are essential for making the right decisions on complex ethical issues.

4. Growing student expectations and expanding the range of digital opportunities are putting increasing pressure on teachers' digital skills: someone needs to conduct learning analysis, develop online materials, etc. Experience shows that considerable attention should be paid to teachers and how they use (or plan to use) proactive teaching methods.

5. Digitalization promotes closer teamwork in education, where teachers receive support from specialists in areas such as online teaching methods, instruction design, and the use of video resources and social networks. All of these factors make a big difference to the requirements for teachers' teaching skills, as well as the training and support they need.

6. Universities in the Netherlands are strengthening research on academic education. Digitalization expands opportunities for quantitative research in higher education. Engaging disciplines other than educational sciences, such as neuroscience and cognitive science, in educational research can encourage us to improve our evidence-based programs and develop new teaching methods and practices.

7. Universities plan to open universities to test new forms of digitization.

8. Universities are exploring digitization opportunities to increase the flexibility of educational structures. Digitalization opens up opportunities for universities to create flexible programs and offer software components in the form of distance learning courses. This opens up opportunities for the variety of programs offered to the working population and for specific groups of students who need such programs.

9. Universities join forces to conclude agreements and create secure infrastructure in cooperation with other universities.

10. The Netherlands creates a practical organizational format that offers a wide scope for experimentation and allows you to quickly and easily share and jointly develop the acquired knowledge and experience of digitalization of Education [6].

If we consider the process of digitalization in the context of German higher education, it is worth paying attention to the Federal Digital Agenda, the Analytical Center "Hochschulforum Digitalisierung" which calls for research proposals of the federal government that promote research on digitalization in higher education through funding from the German Ministry of education and research (BMBF). In order to carry out major social, political and economic transformations, the German government has developed a

national digital program that applies to all levels of Education. The federal government sees digitization as a way to transfer knowledge and innovation in science, but it also expects its citizens to be able to fully participate in education and society.

To focus on a wide range of aspects of digitalization in the context of Higher Education in Germany, such as internationalization, organizational change and transformation of teaching and learning, an expert forum called "German forum of higher education in the digital era" was created. It discussed teaching and learning issues such as: "innovation in digital teaching is not only technical innovation, but rather academic, educational, organizational and structural innovation"; "the use of digital media contributes to improving teaching in higher education"; "technological change not only creates new virtual learning environments, but also changes existing physical learning environments"; "universities lack digital innovation in teaching and learning, but their structural and strategic progress is insufficient"; "integrating digital media into teaching and learning is a complex process of negotiations between different stakeholders in universities" [2].

Practice shows that German universities have a large number of Digital higher education programs. For the most part, online offers complement traditional face-to-face training. Accordingly, students prepare for seminars through video, for example, perform self-study programs during classroom sessions or make group presentations using digital media. The university promotes the full range of blended learning formats in all faculties. As a result, educational videos, virtual labs, and interactive learning platforms are now part of everyday student life.

Digitalization promises didactic innovation: electronic tools promote flexibility, methodological diversity, and motivation to learn. Another advantage, especially for international students, is the independence it provides in terms of place and time. Online formats are available from all over the world, and chats and forums promote virtual mobility and cross-cultural sharing. It is also easier to overcome language barriers with e-learning modules if they can be made in different languages. In addition, digital learning prepares students for the world of work, which is increasingly characterized by digitalization [9].

In Austria, in 2018, the government published a "Master Plan for Digitalization", which describes the main areas of action. The first concerns training programs and their development, through which digital content should be integrated. The second one concerns the training of teachers, focusing on the ideas of introducing digital literacy into the educational process. "Digital Education" covers digital and media competencies, and civic education. The main goal of the Austrian education system is to develop students who deal with media technologies to be more responsible and well-informed in social aspects of digitalization: displaying the use of digital devices in everyday life; information, data

and media: queries, source evaluation, information exchange; operating system and standard software: basic knowledge of operating systems, text processing, presentation software, computing; media design: adaptation, creation of media; communications and social media: various communication platforms, creating digital identities, cloud exchange; data security and privacy: device security, as well as personal data; solving technical problems: solving basic IT problems; computational thinking: working with algorithms, creative use of programming languages [18].

The vast majority of teachers in Poland use technology as a substitute for traditional teaching methods, that is, as a means of transferring knowledge (for example, showing multimedia presentations, films). The use of modern technologies allows you to meet the individual needs of students and create a work environment that meets individual learning styles. Thanks to the use of digital resources in their studies, students become more active and independent. They are more willing to perform tasks that require technical support. Technology motivates and provides positive stimulation. For many teachers, using digital resources means saving time, both during preparation and during classes. Using various educational tools, programs, or platforms reduces the time required to prepare a didactic resource.

Improving teachers' competence in the field of new technologies has become a key element of Poland's educational policy. One of the events in this direction is "Poland 2030. The third wave of modernity. Long-term national development strategy". The priority is to improve the quality of human capital, and the state is obliged to equalize educational opportunities at every stage of education and improve the quality of educational services. Digital Poland includes the dissemination of digital and media education at every stage of formal education (improving the competencies of teaching staff) and the use of digital technologies throughout the entire educational process. The goal is to improve access and quality, which includes the following tasks: introduction of new models of educational and professional competencies and careers, including, for example, mandatory competencies in the use of new technologies in teaching all subjects. The creation of a "Digital Poland" is a response to the demand for effective systemic mechanisms for the development of digital literacy (in formal, informal and non-formal education). This will be implemented, among other things, by developing digital literacy among educators (teachers and employees of all educational and cultural institutions) and introducing universal digital education in Polish society [25].

Digital literacy is also one of the specific objectives of the Human Capital Development Strategy. It provides for the development of digital literacy of teachers in order to increase the frequency of use of interactive teaching

methods and high-quality didactic electronic resources, as well as equipping institutions with devices that allow widespread use of ICT. During the operational programs at the central and regional levels, many projects are being implemented in Poland to improve the ITK literacy of specialists. Projects funded under this program are divided into three groups: planning and developing broadband infrastructure for high-speed Internet; expanding the range of public services available online; promoting the use of the Internet and improving digital literacy [19; 21].

Poland is currently at the stage of intensive implementation of ICTs in educational processes. The result is not only equipping Institutions of higher education with IT equipment (of different quality), but, above all, the number of central projects and programs that increase the volume and frequency of ICT use. There are also many debates (conferences, expert meetings) related to the analysis of the positive and negative consequences of the introduction of ICT, as well as discussions about the styles of ICT use among children and young people.

Thus, we can say that representatives of the Polish education system are increasingly aware of the opportunities that digital media can offer, and take into account both the risk paradigm and the opportunity paradigm in their analysis. The increase in digital literacy among key stakeholders occurs in many dimensions, mainly through external sources of funding (programs co-funded from structural funds to increase the level of human capital). These multi-level integrated training activities conducted over the past decade show the potential and possibilities of ICT applications in education. The process is also supported by regional conferences and integrated activities carried out by public organizations, methodological centers or self-study groups. Computerization is a well-established process in Polish education, which can be proved by electronic journals, which in many higher education institutions have replaced paper ones, assessment recording systems, etc. [1].

Information educational space, in which well - known innovative electronic educational resources are successfully presented today, using modern technologies (for example, multimedia) and implementing the main didactic functions (interactivity, computer visualization, modeling, archiving, etc.) inherent in information and communication technologies in general, is the environment in which the teacher and students' educational activities carry out their professional activities. At the same time, informatization is one of the main reasons for improving the educational process, under its influence, professional tasks and functions of specialists in the field of Education change, and the process of acquiring knowledge allows you to implement the ideas of individualization and a personal-oriented approach to learning.

Digitalization of education in the practical sense is, first, a change in the content, methods and organizational forms of educational work in response to the demand for training

future specialists to live in the information society. An important distinguishing feature of the current stage of development of society is its increasing digitalization. Scientists have proved that the digitalization of education is one of the most important conditions for the successful development of the processes of digital transformation of society. It is in the educational field that people are trained and educated who will not only form a new digital environment, but who themselves need to live and work in this updated environment [27].

## Conclusions

Technology has revolutionized various fields and sectors, including university education. On the one hand, current students are part of the so-called network (digital) generation, and therefore their growth has always been accompanied by technology, so they are in online communication and interaction.

The tendency of the current stage of informatization of education in European countries is the general desire to develop common pedagogical approaches to the development and use of various digital educational resources, such as: electronic reference books, encyclopedias, training programs, automated knowledge control tools, computer textbooks, simulators and others. In modern psychology, there is a significant positive impact of the use of digital resources in teaching on the development of students' theoretical thinking, as well as the formation of operational thinking aimed at choosing optimal solutions.

The education system of European countries is currently experiencing a significant need for high-quality digital educational resources, which in practice would allow: to organize various forms of student activity on self-extraction and presentation of knowledge; to apply the full range of capabilities of modern information technologies in the process of performing various types of educational activities, including registration, collection, storage, information processing, interactive dialogue, modeling of objects, phenomena, processes, functioning of laboratories.

In many European countries, thanks to digital educational resources, it becomes possible to objectively diagnose and evaluate the intellectual potential of students, as well as the level of their knowledge, skills, level of training in a particular discipline, compare the results of mastering the material in accordance with the requirements of the educational standard; manage educational activities adequately to the intellectual level of a particular student, the features of his motivation, taking into account the implemented methods and means of teaching; create conditions for the implementation of individual independent educational activities, form skills of self-study, self-development, self-improvement, self-education and self-realization.

Summarizing all the above, it is advisable to note that all European countries emphasize that digital educational resources in professional use allow you to implement a fundamentally new approach to teaching and education, which: based on broad communication, free exchange of opinions, ideas, information of participants in a joint project, on a completely natural desire to learn new things, expand your horizons; it is based on real research methods (scientific or creative laboratories), which allow you to learn the laws of nature, the basics of techniques, technology, social phenomena in their dynamics, in the process of solving vital problems, features of various types of creativity in the process of joint activities of a group of participants; contributes to teachers' acquisition of various related skills that can be very useful in their professional activities, including the skills of using computer equipment and various digital technologies.

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