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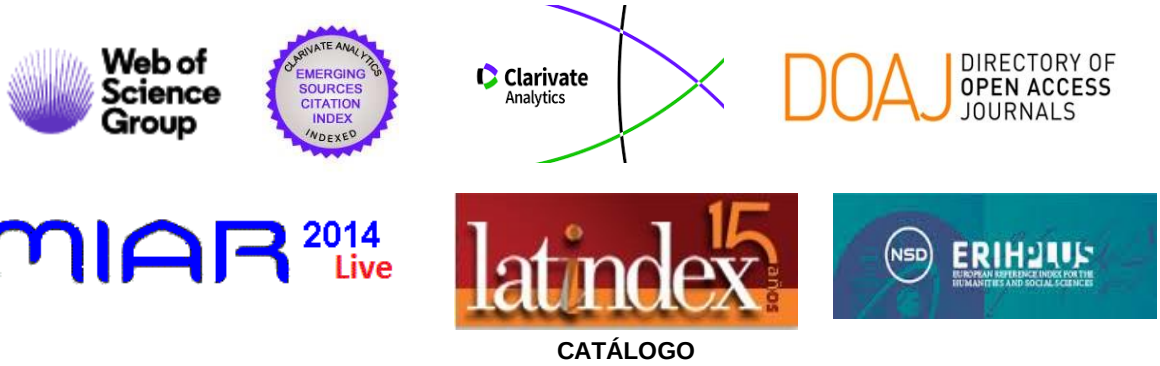

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DIGITAL EDUCATIONAL ENVIRONMENT AS A SYSTEM-FORMING ELEMENT OF DIGITAL DIDACTICS

Ph. D. Olena Sagan
Kherson State University, Ukraine
ORCID ID: https://orcid.org/ 0000-0002-3195-3686
evsagan777@gmail.com
Ph. D. Yaroslav Nahrybelniy
Kherson State Maritime Academy, Ukraine
ORCID ID: https://orcid.org/ 0000-0003-3266-5798
innanagribelna@gmail.com
Dr. Inna Nahrybeina
Kherson State Maritime Academy, Ukraine
ORCID ID: https://orcid.org/ 0000-0001-6393-3754
innanagribelna@gmail.com
Dr. Valentyna Fediaieva
Kherson State University, Ukraine
ORCID ID: https://orcid.org/ 0000-002-8658-1885
valentina.fediaieva@gmail.com
Dr. Natalia Liba
Mukachevo State University, Ukraine
ORCID iD: https://orcid.org/0000-0001-7053-8859
n.liba@mail.msu.edu.ua
Ph. D. Natalia Kabelnikova
Kherson State University, Ukraine
ORCID iD: https://orcid.org/0000-0002-5236-2033
nataliavm09@gmail.com

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Abstract

Digitization in education is one of the most actual issues in modern society. COVID-19 pandemic and connected with it lockdown showed the necessity of an urgent transition of educational processes of different levels to a mixed or distant education. Such changes in paradigm do not suggest the digitalization of the traditional content, but the creation of an educational system based on digital didactic principles. The article deals with the problem of designing, creation and testing of digital educational environment. The analysis of the researches enables to define the notion 'digital educational environment' and identify its components. The conducted questionnaire of 132 university and college teachers in Ukraine, who provided distant education during COVID-19 lockdown, demonstrated a positive qualitative increase of motivation criterion for the formation and application of all the components of digital educational environment, and allowed to identify the main problems, tackling of which is possible due to synergy of the state, science and system of education.

Keywords

Digital didactics – Digital educational environment – Teacher's digital competence

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Introduction

In the epoch of digital technologies humanityprovided plenty of opportunities for new qualitative ways of acquiring and sharing information, communicating without barriers, acquiring knowledge at the appropriate time and in appropriate place. At the same time, there arose serious challenges connected with the readiness to use these benefits since early childhood, with the search for the effective strategies of information management, formation of a new way of thinking, manner of behavior and activity.

The deformation of the worldview among youth connected with the use of digital resources: information acceleration; clip-thinking; stable sensory hunger; loss of the line of reality etc. has become obvious. Modern researches state the fact that students in most cases surpass their teachers in the level of knowledge and ability to use various digital applications and resources. On one hand, the pandemic situation in 2020 disclosed the problem of sluggishness of a traditional education, on the other hand – it served as a strong impetus for the formation of new requirements for teachers' classification, the search for the effective means and methods of modernization of the whole system of education. In recent years the investigations of the scientists[1] prove the necessity not only to digitalize traditional content, methods and means, but to build a new theory of education, in which digital educational environment is a system-forming center. This theory is known as 'digital didactics' and is defined as 'a section of pedagogics which studies principles, methods, means and organizational forms of education in the context of information educational environment'[2]. The absence of a unified interpretation and approaches to designing of digital educational environment determined the choice of the theme of our paper.

Literature review

In the modern conditions of digitization of all aspects of human life the creation of a single information space as a new human environment, called by K.Kolin[3] an automated info-sphere, has become relevant.

The scientist determines the main components of this space:

1) resources: documents stored in database, digital libraries, resource facilities;
2) community: a totality of individual and collective subjects – information generators and consumers;
3) infrastructure: legal and regulatory, economical frameworks of informational activity, repository of information, technologies of its processing and transmission (including digital one);

[1] M. Choshanov, "E-didactics: A new look at the theory of learning in the digital age", Educational technology and society Vol: 4 (2013): 684-696; E. Smyrnova–Trybulska, "Technologie informacyjno-komunikacyjne i e-learning we współczesnej edukacji" in Information and Communication Technologies and E-learning in Contemporary Education In E. Smyrnova-Trybulska (ed.) (Katowice: Wydawnictwo Uniwersytetu Śląskiego,2019), 54-58; O. Sagan; S. Yakovleva; E. Anisimova; A. Balokha y H. Yeremenko, "Digital didactics as a new model in the theory of education", Revista Inclusiones Vol: 7 num Especial (2020): 193-204 y V. Monakhov, School of V. Monakhov (Moscow: Moscow State University for the Humanities, 2019).

[2] O. Sagan; S. Yakovleva; E. Anisimova; A. Balokha; H. Yeremenko, "Digital didactics…

[3] K. Colin & A. Ursul, Information and culture. Introduction to information cultural studies (Moscow: Publishing house "Strategic Priorities", 2015), 288.

4) activity: production of service and products with the use of informational resources and digital technologies.

Educational environment is a part and indicator of the efficiency of a single information space and, according to T.Meng[4], is structured by surrounding, conditions and influence. In dictionaries the phenomenon under investigation is defined as a collaboration of elements, systems, subjects of an educational process.

The analysis of the investigations of this issue enables to define the notion 'digital educational environment' as:

- a single information space of an educational establishment that combines administrative, economic, information, library, organization subsystems, as well as a knowledge control and statistic subsystems[5];
- systems that accumulate teaching, organizational, technical resources and intellectual capacity of a higher educational establishment[6];
- an open combination of informational systems, aiming at realizing different tasks of an educational process[7];
- a result of transformation of education in the process of informatization[8];
- a set of resources organized in a special way (with a necessary methodological, technological, technical support), that are used for teaching and management of an educational process presented in digital format[9];
- a set of conditions aimed at forming human subjectivity, developing the ability to work in a multi-factor dynamic environment in the conditions of interactionon various levels[10];
- a system of conditions and possibilities for education, development, socialization, human upbringing[11].

Proposed methodology

In the process of investigation such theoretical and empirical methods were used: analysis and synthesis of European scientific resources; comparison of structural elements of classical and digital didactics; questioning of higher educational establishment teachers;

[4] T. Meng, Study of the educational environment: problems, approaches, models (St. Petersburg: Publishing House of Russian State Pedagogical University named after A. I. Herzen, 2011).
[5] O. Il'chenko, "Organizational and pedagogical conditions for the development and application of network resources in the educational process" (PhD, Moscow State Technological Academy, 2002).
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[8] A. Danilyuk y A. Kondakov, The concept of the Basic competence model of the digital economy Retrieved from: http://www.ranepa. ru/images/anons/2018-12/Konceosiya-bmkce.pdf, (25.04.2020)
[9] A. Biankina, "Digital technologies and their role in the modern economy", Economy and society: modern models of development Vol: 16 (2017) y M. Vaindorf-Sysoeva & M. Subocheva, "Digital education" as a system-forming category: approaches to the definition", Bulletin of the MSEU num 3 (2018).
[10] A. Budarina & O. Loksha, "Use of electronic portfolio in the system of teacher education as an element of the organization of the digital educational environment", Bulletin of the Baltic Federal University named after I. Kant. Series: Philology, pedagogy, psychology num 4 (2018).
[11] V. Blinov; M. Dulinov; E. Yesenin y I. Sergeev, The project of the didactic concept of digital vocational education and training (Moscow: Publishing House "Pero", 2019).

analysis of the obtained results. While carring out netnographical research, we used the method of studying of web-sites of Ukrainian universities that train future teachers.

Result analysis

To elaborate criteria and efficiency indicators of digital educational environment one should define the tasks and expected results. From our point of view, the main of them are: the quality of students' learning and skills formation by means of increasing opportunities for constructing of educational tendencies and access to the most modern educational resources; reduction of the period of obtaining educational results; teacher's deliverance from routine actions through its automatization for a productive creative activity.

The principles of digital educational environment are as follows:

1. openness, i.e. the provision of an opportunity and right to use different informational systems in its structure, transform them or add new one on your own initiative;
2. coherence, i.e. theuseofdigitaltechnologiesina single educational and technological context;
3. accessibility, i.e. the provision of an opportunity of an unrestricted (commercial and non-commercial) operation of the resources with the help of the Internet;
4. adequacy, i.e. the correspondence of the completeness of the educational environment to the goals, demands and opportunities of the consumers of educational services;
5. optimality, i.e. the improvementof the educational results; reduction of consumer's labour and time costsdue to new opportunities.

Among the main structural elements of digital educational environment we define technologies, resources and types of activity in their correlation (Fig.1).

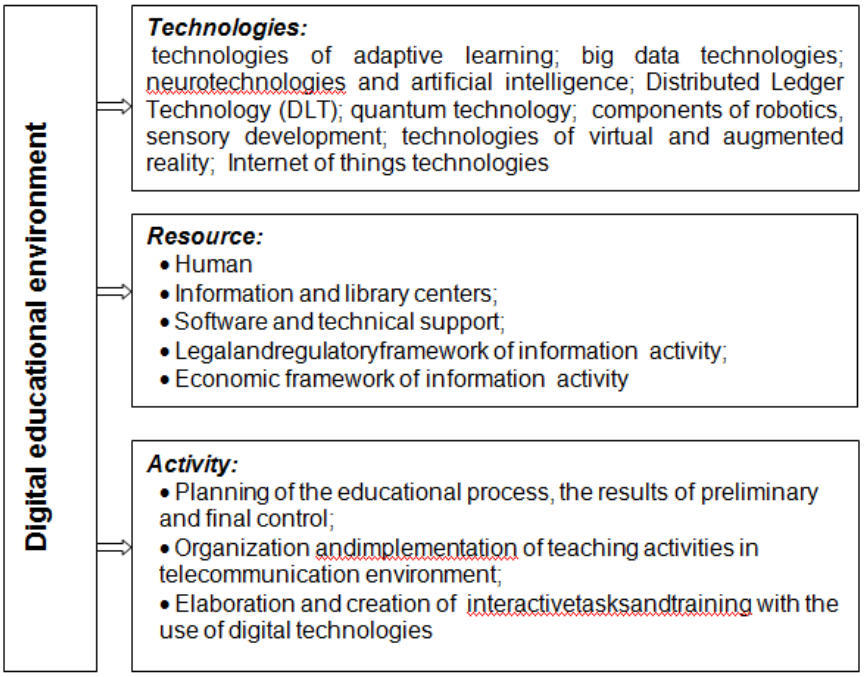

Fig. 1
Structural model of digital educational environment

The result sofpreviousresearches proved that only 5 % of teachers of pedagogical universities in Ukraineworked at the creation and promotion of an effective educational environment with digital content, a system of tasks on different levels and a developed feedback. This demonstrated a low level of teacher's digital competence. The pandemic situation and a forced lockdown 2020 improved considerably these results. Moreover, pedagogical community has dramatically changed its attitude to digitalization of education, defining not only their digital competences but also presence of qualitative infrastructure and modern resources as necessary conditions for the viability of educational environment (Fig.2).

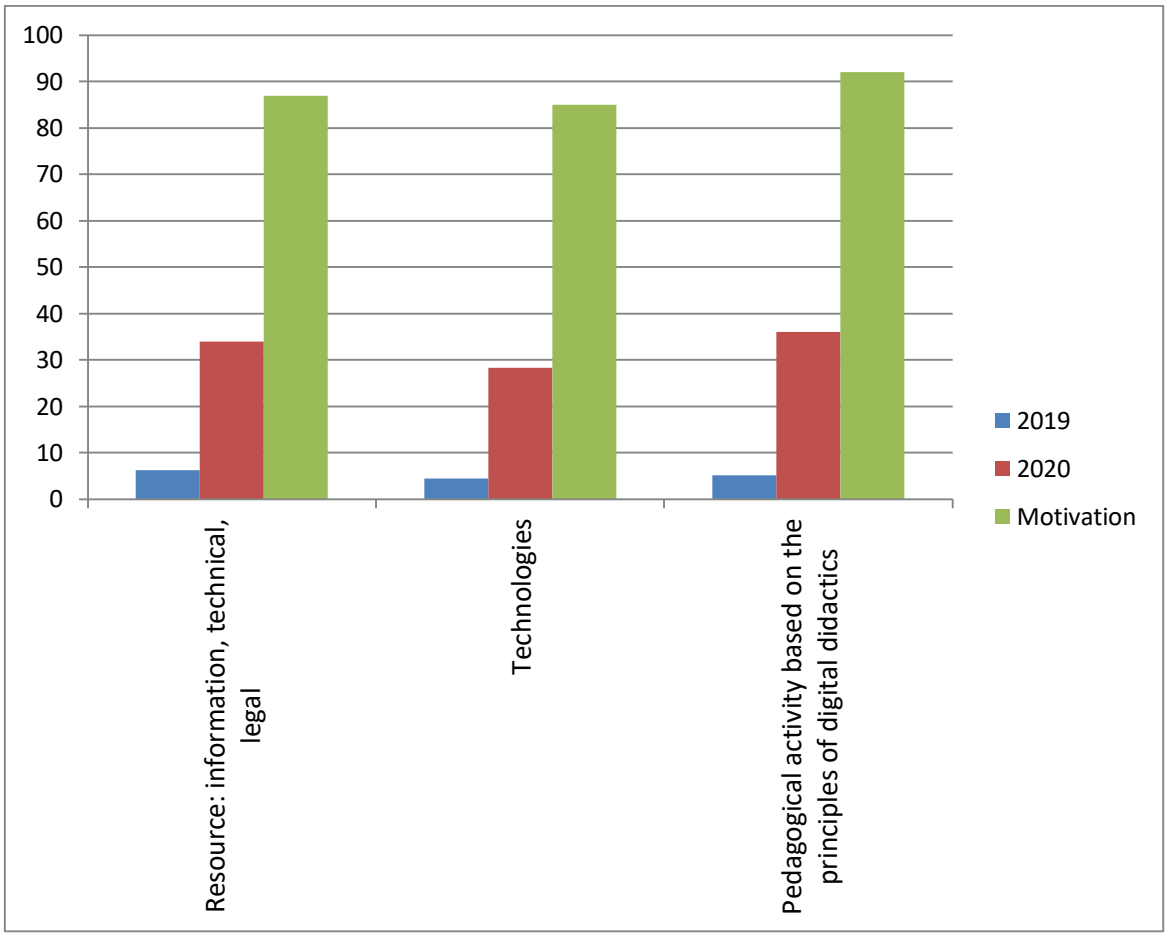

Fig. 2
Dynamics of evaluation of digital educational environment by teachers

Data presented in Fig.2 were acquired as a result of questionnaire of 132 university and college teachers in Ukraine. The great majority of them accept the changes and reconsideration of the current educational process that implies an optimal alternation and correlation of online and offline processes during professional education; motivation of students' teaching activity and self-sufficiencyby means of rich virtual reality in order to support their readiness in solving more complex tasks.

The main task of digital educational environment is the increasing of opportunities for the construction of an individual educational strategy by means of adaptive navigation within teaching material, formation of interaction with an individual user for the adaptation of

teaching material according to his needs, adaptive testing. Such an approach makes it possible to meet the demands of students with different goals, motivation, level of knowledge and experience.

The evaluation of digital educational environment efficiencyis possible through its approbation. The organization of distant education duringCOVID-19 lockdown helped to identify the problems that appear during the process of creating and using of the environment, in addition to getting technological experience by teachers. The questionnaire of the same respondents led to the generalization of the obtained results (Table1).

Aspects of educational environment	Teacher's task	Problem
Learning self-sufficiency	Organizationoftheactivitytaking into account students' goal setting, strict time limits and estimation of educational results	Digital resources with the opportunity of motivation to obtain an educational result, qualitativefeedback, adaptivetestingateachstage oflearning
Content	Distribution of the material according to the principle offline + online	Selectionofadigitalresource, the use of which improves the quality of learning the material in comparison with traditional one
Technologies	Use of pedagogical technologies based on the students' personal activity	Approbation of digital didactic technologies
Social mechanisms	Searchforgrouptrainingmethodstodevelopteamworkqualitiesandcultureofconstructiveinteraction	Digital resources which provide competitiveness, cooperation, peer learning and reciprocal evaluation
Results	Aregularindividualfeedbackon all the actions	Digitalresourceswhichhelptoorganizeindividualstrategiesinaccordancewithstudent'spersonalrateandwillingness, hisopportunitytoestimateownachievementssubjectively (theamountoftime, efforts, knowledge needed for achieving the results, how much he/shesucceeded in proving him-/herself).

Table1
Questionnaire results

These results define the goals for designing and realization of educational environment: improvement of material and technical resources for synchronization and consolidation of resources of all subjects of network interaction; extension of the range of educational services, including a wide use of digital resources; increasing the level of teachers' professional competence for the creation and promotion of methodically useful content.

Conclusion

A qualitative increase of motivation criterion for the formation and application of all the components of digital educational environment helps us to define primary tasks, the realization of which is possible due to synergy of the state, science and system of education.

1. Overcoming of technical inequality among the subjects of educational process on the level of state and educational establishments: broadband Internet availability, digital gadgets for all the students, technical support.
2. Promotion of modern digital educational resources as an environment for digital educational content designing, organizing of quality communication, using of tools during educational process.
3. Elaboration and mastering of big data technologies; neurotechnologies and artificial intelligence; Distributed Ledger Technology (DLT); robotics, sensory development; technologies of virtual and augmented reality; Internet of things technologies, etc.
4. Increasing the level of teachers' digital competence at all stages (university and postgraduate education, informal self-education, etc.)

The understanding of the fact that humanity faces a new challenge and perspective of the organization of a new type of educational processes, forced scientists to provide in the short term theoretical foundation and certain instructions for the improvement of digital educational environment.

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89600, м. Мукачево, вул. Ужгородська, 26
тел./факс +380-3131-21109
Веб-сайт університету: www.msu.edu.ua
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