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**RESEARCH ACTIVITIES OF POSTGRADUATE EDUCATIONAL
INSTITUTIONS IN THE ERA OF THE DIGITAL SOCIETY**

The author has done an analysis and described the state of researching an issue of organizing and undertaking research activities at educational institutions at the stage of development of the digital scientific infrastructure in Ukraine. The author has suggested solutions of this issue, using research activities of a department at a particular postgraduate educational institution as an example. Digitalization and openness of research activities of a postgraduate educational institution in general and departments – its main units – in particular are the key to successful scientific activities of postgraduate educational institutions. In the process of examining, the author has used a complex of theoretical and empirical methods being adequate to a purpose and goals of the done research.

Key words: digital society, research activities, postgraduate education, innovative technologies, electronic university, open education.

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НАУКОВО-ДОСЛІДНА ДІЯЛЬНІСТЬ ЗАКЛАДІВ ПІСЛЯДИПЛОМНОЇ ОСВІТИ В ЕПОХУ ЦИФРОВОГО СУСПІЛЬСТВА

У статті зроблено аналіз та описано стан дослідження проблеми організація та проведення науково-дослідної діяльності в закладах освіти на етапі розвитку цифрової наукової інфраструктури України та розкрито її вирішення на прикладі науково-дослідної діяльності кафедри відкритих освітніх систем та інформаційно-комунікаційних технологій Центрального інституту післядипломної освіти Державного вищого навчального закладу «Університет менеджменту освіти» Національної академії педагогічних наук України (УМО»). Запорукою успішної наукової діяльності закладів післядипломної освіти, на думку автора, є цифровізація науково-дослідної діяльності закладу післядипломної освіти взагалі та його основних структурних підрозділів – кафедр, зокрема. У процесі дослідження автором використано комплекс теоретичних та емпіричних методів, адекватних меті і завданням проведеного дослідження.

Ключові слова: цифрове суспільство, науково-дослідна діяльність, післядипломна освіта, інноваційні технології, електронний університет, відкрита освіта.

The statement of the problem. Realities of the world dictate terms for modernizing economies and creating clear rules for the new information digital era, which contemplate the increase of the global influence of cutting-edge technologies and the growth of profits from electronic commerce and exchange of data and services. Nowadays, there are technologies, globalization, new challenges and opportunities,

new fields of science, jobs, discoveries, prognostications, and trends. All of them demonstrate that educational institutions should train citizens, who will live and create in the digital society. In The Proposal for a Council Recommendation on Key Competences for Lifelong Learning (Interinstitutional File: 2018/0008 (NLE) adopted on 17 January 2018, the European Parliament and the Council have approved the new edition of key competences for lifelong learning. The digital competence ranks fourth among eight competences [1-2].

The contemporary digital society can neither exist and function nor develop without the science. It poses more and more challenges for the science: searching for effective forms for organizing the science and scientific activity; intensifying a cycle «science – technologies – production». Challenges the humankind faces compel a human to change the attitude towards the science, adopting it to demands of production and production to implications of scientific research. Now, more than ever, the role of research activities – intellectual creative activities aimed at acquiring new knowledge and searching for ways of applying knowledge, which encompass basic and applied scientific research – is a matter of considerable concern [3].

The importance of developing a policy for education and teaching adults in Ukraine and scientific assistance regarding further sustainable development and modernization have become especially obvious after the adoption of the Law of Ukraine «On Education» (2017) [4] and development of a draft law «On Education of Adults» [5]. Thus, the author supposes that the expert community and civil society in Ukraine form the understanding of the importance and timely development of this policy.

Unfortunately, scientists working on a voluntary basis conduct a majority of research projects in Ukraine (so-called social topics).

The purpose of the paper is to analyse the state of examining the issue oriented towards organizing and undertaking research activities at educational institutions at the stage of development of the digital scientific infrastructure of Ukraine and to suggest solutions for this issue, using research activities of the Department of Open Education Systems and Information Communication Technologies (the

Department of OESICT) at the Central Institution for Postgraduate Education (CIPE) of the State Higher Educational Institution «University of Educational Management», which belongs to the National Academy of Educational Sciences of Ukraine (SHEI «UEM»).

The statement of the main material. Yu. Palekha, N. Lemish [6], S. Sysoieva, T. Krystopchuk [7], T. Lebedynets [8], and V. Lozovyi [9] have partially solved and comprehended a problem of undertaking research activities by educational institutions in their scientific papers.

Yu. Palekha and N. Lemish take notice of theoretical frameworks, matters of methodical instruments, technology, and organizing research activities as the theoretical and practical ground for doing scientific research by students in the process of studying at a higher educational institution and the further scientific activity effectively and ably. These authors consider a notion of research work. They highlight that the global scientific community differs notions of a scientific project and research project.

S. Sysoieva and T. Krystopchuk perceive a research project as a component of professional training of students. They consider a process of organizing research activity as a set of purposeful processual actions of participants (lecturers, students, et al.) during academic and extracurricular activities in compliance with technologies, which ensure implementation of a person-oriented model of the interaction in order to facilitate a student to form necessary competences.

T. Lebedynets thinks that research activity, which direct creativity of lecturers towards developing new theoretical conceptions, effective methodical instruments, educational technologies, etc., is an important component of professional activities of lecturers.

V. Lozovyi has examined that international collaboration in science and technology (ICST) is a powerful resource for developing the domestic science and modernizing the economy and society. Ukrainian scientists actively collaborate with international organizations (the Euratom Program, research projects of the European

Organization for Nuclear Research, the European Research Coordination Agency (EUREKA).

Nevertheless, there are no contemporary scientific papers concerned with an issue of developing and modernizing research activities of temporary creative groups from among academic personnel of higher educational institutions, as well as postgraduate educational institutions (PEIs), particularly under conditions of the digital society.

In contemporary Europe, the population is creating the inclusive digital society, in which citizens have essential skills of access to opportunities of the Internet. This increases their chances of optimal employment, education, and business and social activity, as well as forms a new learning environment. Nonetheless, success of creating and applying new technologies depends on comprehension of a new educational paradigm aiming at developing a free personality rather than acquiring a certain amount of knowledge. This paradigm implies practice-oriented forms of higher education and forming a professional as a bearer of a project- and activity-based worldview. Such professional should be able to manage and continuously increase knowledge, and turn the science into the technology of activity. At the present time, development of the digital economy of Ukraine consists in creating market incentives, motivations, and demand, as well as forming needs for the use of digital technologies, goods, and services among Ukrainian sectors of the industry, human activities, business, and society in order to ensure effectiveness, competitiveness, and national development of these sectors, to raise volumes of production of high-technology products, and to increase welfare of the population [10].

In the contemporary Ukrainian digital society, digital information communication technologies replace a book and information printed on paper. Such technologies are a leading bearer of a problem related to development of «digital» skills and competences, new opportunities of preserving and transferring information, which requires new entities and methods of management. Smartphones and laptops obscure powerful technological development to be characterized as «digitalization», «automatization», and «joining within a network». Preserved data are processed

automatically so that they become promptly accessible throughout the world owing to a network. All these factors lead to changes and new challenges. It means not only free access to information but also the loss of the entire professional fields due to the lack of demand for them under new conditions.

Analysing digital development of Ukraine, authors of the Conceptual Framework «Digital Agenda of Ukraine – 2020» point out that development of the scientific «digital» infrastructure is determinative for ensuring open access to scientific data and knowledge, further commercialization of scientific research, and creating innovation, goods, and services [11].

The Conception's authors assert that knowledge and development, which have been acquired at the expense of the State Budget of Ukraine, should be disseminated through open access. In addition, the absence of access to global scientific digital infrastructures – to the global knowledge base, computing services, consultancy services, research in basic and applied fields – negatively influences the Ukrainian science in general and establishes significant constraints for Ukrainian scientists, engineers, and governmental officials. These constraints impede them to really indicate and estimate opportunities of the Ukrainian science, to search for variants of collaboration within international projects, including towards directions concerned with digital technologies (Big Data, Data science, machine learning).

It is worth mentioning that development of the digital scientific infrastructure depends on the current financing and an opportunity to involve funds from investors and public-private partnership. The connection of Ukrainian scientific digital infrastructures to European analogues will enable to use the current infrastructure of Europe for solving Ukrainian relevant scientific and economic problems at the minimum use of government resources.

The recent initiatives of the EU in this field are as follows: creating the European Research and Innovation Framework Program Horizon 2020 («Open Innovation», «Open Science», «Open to the World»), the European Cloud Initiative (building the European Open Science Cloud and the European Data Infrastructure), which will

render «digital» services to scholars, the industry, business, and governments of the EU member countries.

Having examined experience of domestic and foreign scientific institutions, the author concludes that accomplishing a goal related to developing the contemporary digital economy and digital society requires the optimal use of cutting-edge models of innovative processes. Research innovative higher education establishments in general and departments as structural elements of these establishments are an important component of the mentioned innovative processes. Working in close cooperation with a government, local self-governments, and economic entities, more and more research establishments turn into centres for innovative development, which achieve considerable acceleration of processes concerned with implementing results of research and development in technologies, goods, and services demanded by the economy.

The Department of Open Education Systems and Information Communication Technologies at the Central Institution for Postgraduate Education of the State Higher Educational Institution «University of Educational Management» is an example of research activities of a particular unit at a postgraduate educational institution. Drawing on contemporary pedagogical, information, telecommunication, and digital technologies, this department conducts a research project «Theoretical and Methodical Frameworks for Implementing Blended Learning Technologies in a System of Open Postgraduate Education» (2017–2019) with the state registration number 0117U002382.

Digital technologies enable to make research projects mobile, open, transparent, as well as to involve students of skill enhancement programs from among managerial, pedagogical, and academic personnel of education in scientific processes, scientific discussions, public discussions of scientific conceptions, statements, etc. Such technologies underlay research activities of academic personnel at the Department of OESICT. Simultaneously, such technologies supplement scientists rather than replace them. Adaptiveness, manageability, interactivity, combining individual work and teamwork, the absence of time limit for conducting a project are inherent to such

research. The researchers have created the information and education space on the Internet (IESI) for scientific activities of the Department of OESICT. Having drawn on the Microsoft Office 365 platform and digital technologies, the researchers apply new methods of scientific research (management and analysis of large volumes of data, modelling results of scientific research, and remote instruments). The academic personnel of the Department of OESICT creatively apply instruments of the Microsoft Office 365 platform in exchanging data and crowdsourcing for goals of the scientific project. A web page of the Department of OESICT on a website of the SHEI «UEM» (a section «Scientific Activity» [12] and an electronic library of scientific outcomes obtained by the academic personnel of the Department of OESICT [13]) gives access to publications and primary data, and ensures transparency of scientific processes.

The author points out that there is a sufficient amount of tools for planning and organizing the effective space for sharing thoughts and experience, as well as studying in the Office 365 single integrated space (Yammer, Outlook, Skype for Business, Delve blogs, SharePoint elements, etc.). Owing to an advantageous combination of functions of the Microsoft Office suite and Microsoft online services, the new Office 365 suite will help units of educational institutions to save money and time, as well as to optimize workload of IT staff: the Office 365 services are ease in use and useful for administration; they are notable for the high level of security and reliability.

The comprehensive activity of the Department of OESICT encompasses automating management of not only an educational process but also research activities. This is one of a prior direction for digitalization of activities at the SHEI “UEM”, which comprises: a) direct collaboration with the Microsoft Ukraine software company; b) creating internal social networks for the communication and interaction; c) organizing video and audio conferencing; d) setting up programs for exchanging rapid messages; e) hosting an e-mail service accompanied by a calendar function; f) creating and editing documents online. The cloud format means that the entire data are saved by the Microsoft Trust Centre rather than on a user’s computer. This provides users with access to documents and data from various gadgets through the Internet, using the web browser. Applying cloud computing is not only a know-how of the Department of

OESICT but, above all, information security of the content of scientific and educational activities of the SHEI «UEM» in general.

The digital science contemplates involvement of a wide range of scholars, as well as representatives from among non-governmental organizations in a scientific process and discussions. For instance, the IESI of scientific activities at the Department of OESICT includes a website «Scientific Events of the Department of OESICT (Seminars, Conferences)», which represents Google Sites – one of the Google services [14]. The website is created and actively functions for accomplishing the following goals: scientific communication between leading scholars, young researchers, and practitioners in the education sector regarding substantiation and explanation of the terminology, content, and peculiarities of applying remote, electronic, digital, and blended technologies of studying at educational institutions; forming information and digital competences of education process participators under the reform of the New Ukrainian School; orienting results of scientific research towards modernization of educational activity at educational institutions; fostering systematization and dissemination of contemporary sectoral and inter-sectoral knowledge; acquiring cutting-edge scientific and practical achievements both in Ukraine and abroad. Some scientists of the department are members of the All-Ukrainian Non-Governmental Organization «Consortium of Postgraduate Educational Institutions» aimed at developing and protecting the lawful social, economic, creative, age, national, and cultural interests of organization's members, as well as conducting to enhancing the level of competitiveness of the education sector of Ukraine and development of the Ukrainian society.

To ensure the high level of organizing access to electronic resources of Scopus and Web of Science academic databases and academic periodicals of leading publishing companies such as Elsevier and Springer at the SHEI «UEM», the academic personnel of the department have activated activity concerning presenting publications of the scientists in compliance with requirements of international academic databases and search engines. For example, the academic personnel of the Department of OESICT are registered in the following open-access academic databases and search

engines: Google Scholar, «Bibliometrics of the Ukrainian Science», ORCID iD, Scopus Author ID, ResearcherID. To respond to challenges of the open digital society and to modernize a system of postgraduate education, the scientists of the Department of OESICT actively collaborate with the Microsoft Ukraine software company, its partners – TekhStandart and BMS Techno, STEM-Education, and Epson Ukraine. The academic personnel of the Department of OESICT participate in international scientific projects (the Ukrainian and Austrian Project «KulturKontakt» (Austria), the international project Interintelligent of the Centre for Science and Innovations of Sustainable Development Ltd. (Slovenia, Ljubljana), and the online intern program of Sustainable Development Ltd. based in Slovenia (University of Ljubljana, Slovenia).

Consequently, improving the digital competency of academic personnel of an educational institution towards research activities in accordance with requirements of the digital society facilitates its transition to the status of electronic university as an educational research establishment – an innovative institution with modern conditions, which foster development of determined skills of participators of an educational process. These skills enable the participators to promptly solve educational problems in compliance with requirements of the digital society on their own.

Conclusions. Results of the done research show that a strategy of research activities of postgraduate educational institutions should be oriented towards undertaking measures concerned with transformation of the science into a progressive factor of activities in the postgraduate education sector, which will meet demands of lifelong learning as an integral pedagogical system. This system provides the organizational, information, and technological basis, which underpin fulfilling needs of participators of an educational process for studying and personal development. Nowadays, universities are primarily intended to ensure an entire cycle related to creating innovations. This cycle consists of the following elements: a) generating ideas, doing fundamental research, protecting copyrights (the conceptual solution of problems concerned with creating innovations); b) applied researches, the experimental development (a verification and testing stage of solving a problem

concerned with creating innovations); c) implementing research results, transferring finished goods to a market, and commercialization of goods.

The author has examined that there are a set of factors being the key to successful scientific activities of PEIs towards digitalization. These factors include: creating new highly effective pedagogical technologies, social networks of PEIs, the spread of cross-border information and telecommunication technologies of learning, providing corresponding financial support and personnel training, further accelerated development of an information and communication system of a PEI; the effective use of a website of a PEI, which will ensure a corresponding reverse influence on qualitative indicators of its scientific activity; activation of scientific and information maintenance of scientific research through founding and supporting new forms (electronic gradebooks, video and Internet conferences, online lectures in English and other languages of the EU, etc.); extension of an area for the use of opportunities of the Internet in order to test scientific researches so that domestic, European, and international experts may thoroughly discuss them.

The author asserts that those countries, which consider education and science as a strategic reserve of their evolvement, will have prospects of a successful country of the third millennium. Therefore, scholars should also take into account approaches such as the interrelation of national security of the country, education, science, and the digital information space in the process of further scientific research on issues of research activities of postgraduate educational institutions in the era of digital technologies.

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