ECOSYSTEM OF TRANSFORMATION OF TEACHERS PROFESSIONAL DEVELOPMENT OF IN CRISIS CONDITIONS

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From time to time, many countries around the world are facing the problems of educational crisis which occur during the war, natural disasters, epidemics and so on. For several years in a row educational system in Ukraine, as well as in other countries, has been functioning under conditions of crisis caused by the Covid-19 epidemic, which led to the corresponding quarantine restrictions. For our country this period was followed by new challenge – introduction of martial law in the result of war unleashed by Russian Federation. In war conditions the competencies of managers and teachers of educational institutions require significant dynamic changes, which we consider as transformation of professional development. War and other crisis situations cause a drastic break in established norms and stereotypes in regard of professional activity of teachers, at the same time crisis situations can disable the performance of certain functions by teachers.

Therefore, despite all current negative effects, and in order to ensure and maintain the functioning of country's educational system, it is necessary to prioritize the transformation of professional development of educators (both managers and teachers) so that they could quickly acquire those competencies that will form the basis for professional activity in new, unusual, uncertain, dangerous conditions. It should be noted that regardless of crisis situations, the events taking place in modern pedagogical world show that educational system is getting closely connected with process of society digitalization. It is known that postgraduate education provides teachers with new opportunities to be involved in educational activities, regardless of their place of residence, to choose and implement an individual trajectory of professional development. The starting point of our work is a definition of crisis as a sharp change in the state of things, a breakdown, an aggravation of situation. We studied a critical manifestation of contradictions in the socio-economic system or a separate organization, as a factor which threatens its

stability in the surrounding environment and makes it impossible to perform functions in the usual mode [6; 7; 9]. It is during the crisis that the need for qualified personnel increases significantly. After all, highly qualified managerial, pedagogical, scientific – pedagogical staff are able to overcome the crisis and its consequences.

The crisis causes the problems related to ensuring stable functioning of professional development system, its management, finding new opportunities for maintaining of educational process and scientific / methodological activities without reducing the quality of education [8, p. 1]. In the context of all above mentioned, there take place the transformation of postgraduate education and the methodology changes characterized by fundamentally new features, namely: demand for the support of educator`s professional development based on own experience and mastering of modern effective technologies, updated content of education, communication in the system of subject-subject mode.

The International Rescue Committee (IRC) has recently published a list of 2022 emergencies – a global list of humanitarian crises expected to worsen during the next year [4]. Actually, the site features «10 biggest crises that cannot be ignored by the world in the year of 2022». However, on March 1, 2022, the editor added the following remark: «The list of 2022 emergencies was compiled before Russia's invasion to Ukraine». In view of current situation in Ukraine, the authors propose to add Ukraine to this list and to put it in the first position, namely – position 0. As a result, the list corrected by the authors will look like this (numbering from top to bottom) [4]:

10. Sudan – Political tensions in combination with regional drought and conflicts.

9. Syria – Economic crisis follows the decade of war.

8. Somalia- Access to humanitarian aid is complicated proportionally to increasing needs.

7. Myanmar – Dead end situation results in increase of impoverishment.

6. Democratic Republic of Congo – conflicts and diseases are combined with crisis.

5. South Sudan – regional tensions increase risks.

4. Nigeria –growing insecurity reported all over the country.

3. Yemen – experiences cumulative effect of long-lasting conflict.

2. Ethiopia – experiences critical situation due to combination of climate challenges and ethnic conflicts.

1. Afghanistan – experiences post-conflict crisis

0. Ukraine – Russia's violent full-scale invasion to Ukraine brings global destruction of all components of state infrastructure (social, engineering, medical, transport, education and other industries).

In view of all above mentioned facts, the authors of the article chose to describe the impact of crisis situations on necessity to create digital ecosystems such as NGDLE (Next Generation Digital Learning Environment) designed for professional development of teachers in digital twins of postgraduate educational institutions. In recent years, the scientists have developed a vision of next generation digital learning environment NGDLE as an extremely adapted ecosystem of digital tools used to support the activities of participants in educational process [3]. Researcher Michael Feldstein notes that the term NGDLE was adopted to denote what should follow the era of LMS (Learning management system) [3]. The authors use this term to combine several key points.

First, the future of Ukrainian education should acquire a new model focused on learning with accent made on increase of practices used for next generation preparation for work in technological society. Second, future education must be digitally based, given that digital technologies have practically become part of all teaching and learning practices. Third, it must be an educational environment or holistic and dynamic ecosystem, characterized by sustainable development as a community of participants in educational process, tools and educational content. «The basic message of NGDLE research is that all participants in educational process must have the ability to shape and adjust their learning environment according to personal needs and tasks. By supporting component architecture based on standards and best practices, NGDLE encourages the research into new approaches and development of new tools» [3]. Earlier the EDUCAUSE and The Bill and Melinda Gates Foundation have already launched an «investigation into what this next-generation education system might look like. Its main functional areas were: compatibility, personalization, analytics, consulting and evaluation, cooperation, availability and universal design. Since no program can cover all these areas simultaneously, the authors recommend a Lego approach to NGDLE implementation, which builds NGDLE-compliant components that enable individuals and institutions to create learning environments according to their requirements and goals» [2]. The novelty of presented hereby results of theoretical and practical research on transformation of postgraduate education in crisis conditions, lies in introduction of new concept of digital ecosystem, substantiation of ideas for usage of ecosystems of NGDLE type for professional development of Ukrainian educators.

What exactly motivates us to regard NGDLE as ecosystem? At first glance, gadgets and digital technologies are the opposite of wildlife and anti-environmental. Even in society, particularly in education, there is a widespread perception that the digital world is harmful to humans. In order to characterize NGDLE as an ecosystem, let us recall that an ecological system

(deriving from Greek Οκος – home, habitat and Greek σύστημα – system) is a collection of living organisms (biocenosis) that have adapted to living together in a certain habitat (biotope), forming a single whole with it [2; 3].

Based on this, we will try to identify and characterize the properties of NGDLE that make it related to ecosystems. In a broad sense, eco-, environmental friendliness – means unity with nature, human being harmless to nature, as well as favor of natural factors and natural environment for human being. In pedagogy, such approaches are reflected in the principle of environmental education and upbringing of children (J.A. Comenius, J-J. Rousseau, I.G. Pestalozzi, K. Ushinsky, V. Sukhomlinsky).

If we draw an analogy between the ecosystem and NGDLE, we can say that it can be considered as an environment where a person, teacher, child, any participant in educational process in conditions of favorable environment, acquires the necessary knowledge together with other people – tutors, mentors, teachers, consultants, coaches. At the same time, a group of people has an opportunity for both group interaction in learning process and individual work. NGDLE regarded as ecosystem is a place where digital resources and people coexist. The collection of people is analogous to the biocenosis (collection of living organisms), the digital environment is analogous to the biotope (common home, environment of coexistence). Digital environment and people form a whole and in this sense it can be regarded as ecosystem.

People in digital ecosystem must adapt to its specific features while digital environment must be safe and comfortable for people; that is a condition for coexistence. NGDLE has certain features in common with ecosystems, namely: operation under certain conditions; signs of open systems (exchange of resources with the environment, free entry and exit of participants); provision and support the exchange of information; Inclusion of structures for obtaining primary information; Inclusion of structures that convert primary information and enable the system functioning; safety and comfort for each participant in educational process; stability, ability to maintain structure and function under the influence of external factors; vulnerability (possible harm from external factors or possible adaptation to new conditions).

Researchers describe NGDLE as «a loose network of diverse components designed for mutual work – a confederation of IT systems and application components which comply with general technical standards. This combination would provide diversity and consistency. "NGDLE can be also defined as «dynamic and interconnected community of participants in educational process with usage of constantly evolving tools and content» [1].

As mentioned above, the urgency of creating NGDLE for training has increased due to long period of quarantine restrictions and war in Ukraine (2022) started by Russia. New current conditions of unpredictability of further course of events and remoteness of participants in educational process

have prompted the creation of NGDLE ecosystem in the format of Web-portal. The functions of web-portal provide not only for training and professional development of specialists, but also for proper quality of educational process management.

Thus, the need for development of postgraduate education alongside with current crisis conditions dictated the necessity for creation of qualitatively new model and formation of conditions for educators professional development in format of ecosystem. The identified trends in creation of ecosystem for educational institutions indicate that Ukrainian educational system is expected to enter the period of innovative changes adaptable to crisis conditions.

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ТЕОРИЯ ГРАВИТАЦИИ. ПРОБЛЕМЫ И РЕШЕНИЯ

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Наблюдая падение тел на Землю, люди с древнейших времен задумывались над его причинами. Первыми пытались ответить на этот вопрос античные мыслители.

Демокрит предложил, в частности, закон «тяготения подобного к подобному». Так происходит потому, по Демокриту, что все атомы стремятся соединиться с себеподобными. Платон отвергал атомистическую теорию Демокрита, но так же, как и Демокрит, объяснял падение тел тем, что подобное стремится к подобному. Аристотель считал, что Земля находится в состоянии абсолютного покоя в центре концентрически расположенных небесных сфер. На самой ближней сфере размещается Луна, на промежуточных сферах – планеты Солнечной системы, а на самой дальней сфере, обращающейся вокруг Земли, закреплены звезды. Все вещи сложены из четырех элементов – земли, воды, воздуха и огня. Земля и вода – тяжелые элементы, а воздух и огонь – легкие. У каждого элемента, и вместе с ним у каждой вещи, есть естественное место во Вселенной, к которому они стре-мятся. У тяжелых элементов и вещей – это центр Земли, поэтому они падают на Землю. У легких – внешняя сфера Луны, поэтому они уст-ремляются вверх. Земля является самой тяжелой, поэтому она зани-мает место в центре мира.

В новое время явление тяготения и ее зависимость от расстояния и массивности тел рассматривали Коперник, Кеплер, Декарт, Гук и др.

Р. Декарт полагал, что все мировое пространство насыщено равномерно распределенным в нем невидимым веществом, эфиром, а небесные тела формируют в нем локальные неоднородности. Пере-пады плотности эфира создают гигантские вихри, которые вовлекают Солнце и планеты в круговое движение. Теорию вихрей с опреде-ленными оговорками поддерживали Гюйгенс и Лейбниц. Ньютон по-казал, что