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Ключові слова: кафедра ЮНЕСКО, наукова освіта, Національний педагогічний університет імені М.П. Драгоманова, Мала академія наук України, підготовка викладачів, відповідальне громадянство, STEAM, STEM.

У статті запропоновано тези для перспективної дискусії навколо місії, цілей та перспектив кафедри ЮНЕСКО з наукової освіти при Національному педагогічному університеті імені М. П. Драгоманова, яка є спробою залучити до обговорення міжнародних читачів. У статті продемонстровано, що кафедра може стати центром науково-дослідної, викладацької діяльності, а також може бути включеною у систему перепідготовки в галузі наукової освіти в Україні, розвиваючи співпрацю з Малою академією наук України як лідером практич-

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UNESCO CHAIR ON SCIENCE EDUCATION AT THE NATIONAL PEDAGOGICAL DRAGOMANOV UNIVERSITY: MISSION, AIMS AND PERSPECTIVES

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ного впровадження підходів наукової освіти. Ключовим результатом низки напрямів діяльності кафедри є формування нового типу мислення студентів – коли наука розглядається як інструмент, засіб вирішення практичних проблем конкретної людини, сім'ї, міста, держави чи в усьому світі. У статті показано, що кафедра зможе створити продуктивні «мости» між українськими та відомими у всьому світі методологіями наукової освіти (TheoPrax, LAMAP тощо), змінюючи українське освітнє середовище.

National educational systems worldwide are the subject of intensive modernization. One of main direction of the mentioned processes is an attempt to actualize the principles of science education as a response on the current social and cultural challenges [2]. Science education is considered not only as a training of new generation of scientists, but as a process of formation in students of advanced and active type of thinking (investigation into the process or subject of study, collection of data, analysis, formation of hypothesis and testing its validity), which is urgently needed in the modern world (business, analytics, IT). As a result, the students' fear of ignorance is replaced by active engagement and confidence. In addition, there is a growing need for the citizens with competence in science for critical evaluation of various problems. From one hand, the stakeholders understand the perspective of modernization steps. From the other hand, the scale of changes is extremely big: successful modernization needs the systematic changes on the different levels of educational systems including the reframing of the teacher preparation model.

Ukraine is also involved into the global trend developing successful practices of science education (mainly at the system of the Junior Academy of Sciences of Ukraine (JASU)). The professional level of the practical implementation of science education approaches let JASU to establish the UNESCO Category 2 Center at 2017. Having long-term strategic partnership with JASU and understanding the need of implementation of science education approaches into the model of teacher preparation, the National Pedagogical Dragomanov University developed the concept of UNESCO Chair on Science Education and applied the request for the chair establishing. The concept of chair establishing has taken into account the fact, that science education involves educational research in the fields of knowledge that constitute the basis for the economic development of the country, namely in computer information technologies, engineering, life and Earth sciences, physical and mathematical sciences, etc. The educational status of the citizens is directly related to the level of economic welfare and, consequently, to the human development index in the country. Taking into account the correlation between the

educational status and the level of economic welfare, the chair will play an important role in the development of national economy.

The activities of the chair aim at the training of highly qualified educators mastering modern methodologies and methods essential for the implementation of the principles of science education. National Pedagogical Dragomanov University, as the leading teacher-training university in Ukraine, has organizational, technological and technical capability for the training of a new generation of educators at the regional, national and international levels. The specialists of the chair will have the opportunity to conduct educational and psychological investigations and experiments with a view to improve current teaching methodology and practices and develop new ones for the implementation of science education into the educational activity at the national and regional levels.

At the end of 2019, UNESCO Headquarter approved the request widening the "window of possibilities" for science education in Ukraine. The concept of UNESCO Chair passed the series of roundtables and working group sessions. It was conceptually represented during the 8th Ukrainian-Polish Forum "Education for Peace" and corresponding publication [1]. The author of the article was involved into the development of the chair's concept personally. Current article is an attempt to involve international readers of the journal into discussion around the mission, aims and perspectives of chair activity.

Receiving UNESCO's positive decision, the chair should correlate one's aims and mission with strategic documents of UNESCO. As an example, according to 2014-2021 UNESCO Medium-Term Strategy [3], the activities of the chair will be primarily focused on the implementation of the following:

- Developing education systems to foster quality lifelong learning opportunities for all. Using the advanced experience, the chair will aim at the fulfillment of university's potential as an advisory body of the Ministry of Education and Science of Ukraine with regard to the continuing education of teachers in new methodologies and methods of science education in schools; arranging advanced training courses for teachers and educators for the implementation of "lifelong education"

concept; implementation of the principles of gender and inclusive education;

- Empowering learners to be creative and responsible global citizens. By means of theoretical substantiation and practical testing of the opportunities for effective synthesis of achievements of advanced educational systems that implement the principles of science education as well as the accumulated domestic experience of teacher training using STEM/STEAM education approaches.

- Strengthening international science cooperation for peace, sustainability and social inclusion. Under current geopolitical challenges in Ukraine, the chair under establishment will be guided by the need for a harmonious combination of national culture and the global progress in the era of globalization and social integration. The principles of sustainable development based on interdisciplinary scientific studies should be met in order to implement and carry out educational activities.

- Fostering creativity and the diversity of cultural expressions. The chair is guided by the need to train creative educators able to achieve their potential through own scientific research and scientific research of their students. The science education is understood as the source of positive transformations for the next generations of scientists.

- Promoting freedom of expression, media development and universal access to information and knowledge. Training of modern educators primarily focuses on the acquisition of advanced scientific knowledge, which is implemented by open access to the sources of literature, recent scientific studies, innovative educational methods and practices, modern advances in general psychology, educational psychology, and neuropsychology. The chair will organize numerous specialized workshops, conferences, trainings, practical courses, summer schools, etc. for free sharing of experience and ideas and in order to promote free communication.

This ambition is essentially captured in Sustainable Development Goals (SDG 4) that covers the universal primary and secondary education, the early childhood development and universal pre-primary education, the equal access to technical / vocational and higher education, the relevant skills for decent work and the universal youth literacy.

Establishment of the UNESCO Chair on Science Education will contribute to the stronger presence of Ukrainian university system in the international scientific and educational area, approximation of Ukrainian teachers' training to the international and European standards, enhancement of Ukraine's global stature and strengthening of its role as one of the centers for introduction of innovative teacher-training experiences in the context of consolidation of community architecture, centered around the processes of innovations' approval, technology development, etc. (STEM and STEAM education with respective combination of multidisciplinary approach and teacher-training focused on application).

UNESCO Chair on Science Education will carry out the following tasks:

- training and retraining of Ukrainian educators up to the world standards in accordance with UNESCO's 2014–2021 strategy, with involvement of leading international experts and extensive use of Ukrainian experience in educational practice, as well as scientific developments and UNESCO's policies;

- modernization of teacher-training programs and content of studied subjects in order to align them with high world standards identified by UNESCO priorities for the coming period;

- organization of international conferences, round tables, etc., held under the auspices of UNESCO.

- establishment and promotion of cooperation between universities under the auspices of UNESCO in the field of science education with the purpose of effective implementation of strategies aimed at strengthening of information society by means of education;

- collection of information, establishment of databank on science education issues and popularization of the need to update traditional teacher-training approaches that exist in Ukrainian system of pedagogical education;

- research on the issues falling within the scope of the chair, in particular, covered by agreements with appropriate UNESCO's Sectors and its international departments against the backdrop of globalization;

- exchange of information and training courses with universities and research institutions of other countries;

- active implementation of the principles of academic mobility as a tool for effective cooperation with other universities and research institutions;

- development of proposals with regard to updating the list of specialties in pedagogical education, based on theoretical studies of achievements by developed countries and practical experience of cooperation with such countries within the scope of the chair.

UNESCO Chair on Science Education will offer the opportunity:

- to improve the content of educational programs in sector-specific subjects and pedagogics for the training and advanced training of educators and students in science education;

- to develop educational materials in science education that can be integrated into the educational programs (such as video recordings, supporting information, visual computing and modeling);

- to establish platforms for the creation and dissemination of interactive online courses in science education;

- to perform training and advanced training of scientists so that they could comply with the requirements of rapidly changing world economy;

- to motivate students and educators by means of scholarships, study grants, internships and other international and state-run programs;

- to develop educational strategies and programs in formal and non-formal educational settings;

- to ensure the collection of data and assessment of the Chair's performance in the implementation of science education concepts in the educational institutions of Ukraine;

- to implement and maintain lifelong learning projects, which includes publications, web-sites, video recordings, TV programs, museum specimens, public events and etc.

A feature and fundamental principle of information society is the need for creation, dissemination and preservation of information and knowledge. Involvement of universities and other institutions producing and communicating knowledge in cooperation has been identified as a priority area of activity of UNESCO Chair. The chair is planning to be the center of scientific support of JASU's practical activity. This institution has more than 60 of the own methods at the different

fields. All of them use the approaches of science education. UNESCO Chair on Science Education is established with the aim to raise the level of scientific substantiation of science education methods practiced by JASU, and develop effective models for training and advanced training of teachers at the National Pedagogical Dragomanov University. In line with the global demand for science education as a trend that responds to the current needs, and taking into account the experience of educators' training within the national educational systems in developed countries, such teachers should be integrated into the educational process, which principles arise out of the fundamental scientific reflection.

The scientific resources of the National Pedagogical Dragomanov University and long-term experience of cooperation with JASU on scientific justification of the models of implementing science education demonstrate the potential that can be further strengthened by UNESCO Chair on Science Education. As of 2020, there is experience of jointly prepared study guides, textbooks and monographs, involving science education approaches, which may be enhanced institutionally through the establishment of the chair. Advanced scientific publications have the potential to get to the level of scientific discussions devoted exclusively to the issues of science education practices, and to become the prerequisites for the development of national science education standards, etc. Furthermore, in its activities the chair intends to utilize the research potential of the National Pedagogical Dragomanov University and engage in research the representatives of world-renowned scientific schools as visiting professors of the chair, as well as to evaluate scientific developments at scientific conferences, round tables, etc. To ensure the research activities of the chair, it is planned to set up a laboratory providing scientific support. This laboratory will act as a center for organization of the chair's research projects in natural sciences, physics, mathematics and socio-humanistic studies.

The chair of the National Pedagogical Dragomanov University, in close collaboration with Geoinformation Systems (GIS) and Remote Sensing (RS) Laboratory of JASU, will create the conditions for mobilizing a wide range of specialists around the problem of IT

use in Earth sciences. Long-term experience of the Laboratory contributed to obtaining by JASU the status of Copernicus Academy. Currently, as the synergy of science and educational practices, this chair is the first Ukrainian organization to have this status. The network of Copernicus Academy connects European universities, research institutions, business schools worldwide with the aim to reveal and process remote sensing data.

Educational developments of the GIS and RS Laboratory (curricula, manuals, guidelines, contests) are theory-based, were tested by JASU and institutions of general secondary education both in Ukraine and abroad (Poland, Slovakia, Montenegro, Kenya) and have a didactic significance. These developments have been evaluated using scientific methods at the National Pedagogical Dragomanov University. Considering the potential and longstanding necessity for the introduction of GIS and RS into the educational practice of Ukraine, the UNESCO Chair will develop a methodological basis for the implementation of IT in the Earth sciences cycle based on the experience of GIS and RS Laboratory of JASU.

UNESCO Chair on Science Education should consolidate the existing potential of cooperation between the two institutions, which will lead to the development of successful science education practices of JASU through greater engagement of the human resources of Ukraine's leading pedagogical institution. A positive experience of joint research of geoinformation systems (GIS) and remote sensing (RS) issues, as well as TheoPrax, German science education method, may be used as example to illustrate the implementation of the principle of combining education and scientific findings. This is not an exhaustive list of examples of all current and prospective lines of activities of the chair.

One of the strategic directions of activity of the National Pedagogical Dragomanov University in cooperation with the JASU is the introduction and development of the TheoPrax Method in Ukraine. This method demonstrates the potential to transform and change the life of a society for the better, which is in line with a number of UNESCO strategic goals. Technical and vocational education and training connect education and the world of work, and aim to address economic, social and environmental requirements, helping young people and adults

to develop the skills needed for employment, decent work and entrepreneurship. The TheoPrax is a method of teaching and learning tailored to businesses and organizations, which offers innovative and creative business solutions. The main goal of the Method is to increase the desire for knowledge in such fields as science and technology, humanities and social studies. With this method, students and teachers, as well as educators and professors can apply gained knowledge in practice and manifest such knowledge in the real life of entrepreneurs. Students, under the guidance of a teacher, carry out specific projects, based on the needs of the enterprise or research institute, thereby developing key competencies and gaining real domain knowledge.

Many years of experience of the TheoPrax Foundation in different countries worldwide (Germany, France, Austria, Brazil, etc.), as well as successful testing of the method in Ukrainian educational projects, demonstrate the topicality of application of project-oriented teaching methods. High potential staff of UNESCO Chair will be engaged in the development of effective mechanisms for adapting the TheoPrax Method in the contemporary educational environment of Ukraine, as well as in providing scientific substantiation for the ways of its implementation in educational practice.

However, this implementation is almost impossible without continuous scientific and pedagogical support. UNESCO Chair at the National Pedagogical Dragomanov University aims to provide such support. It is the goal of UNESCO Chair under establishment, considering the scientific potential of the university (over 250 professors doctors of science in various fields). In the short term, the Chair will face the need to ensure a scientifically based adaptation of the methods offered by the French LAMAP Foundation to the sociocultural context of Ukraine's educational system. In addition, given the experience of international cooperation of the National Pedagogical Dragomanov University and JASU, there is a demand for transfer of educational techniques to a number of countries worldwide, which requires scientific substantiation, taking account of specifics of educational tradition and sociocultural factors. This cannot be performed without scientific research and

extensive use of approaches of comparative pedagogics, cultural studies, education policy studies, etc. with the aim to provide theoretical substantiation of the ability to effectively implement science education approaches in specific sociocultural settings.

Thus, at the article, the aims, mission and future perspectives of UNESCO Chair on Science Education were presented. It was demonstrated that National Pedagogical Dragomanov University as a key pedagogical university of Ukraine can become a platform for large-scale transformations at Ukrainian educational landscape providing research and educational activities in the field of science education. It is true, that initial and one of the most important aspects of implementing of the principles of science education is a teacher with developed skills, the bearer of new philosophy of education. The scientific research of the chair can be implemented in the longstanding and fruitful cooperation of the National Pedagogical Dragomanov University with the JASU – leader in the translation of science education concept into practice in the Eastern European region. The specialists trained by the chair will complement the teaching personnel of the JASU and other scientific and educational institutions. It was demonstrated, that the UNESCO Chair aims to promote the cooperation in education and science between national and international centers of educational innovations, which would contribute to the efficient implementation of new social architecture into a social practice.

The chair has the potential to make a significant contribution to the training (retraining) of teachers, taking into account the trends offered by modern science education. Students of the leading pedagogical university,

joining modern world models of preparation, will emerge as active citizens of the modern global society, implementing in their daily professional educational ideas the ideas proposed by the concept of science education, enhancing the synergy of fruitful cooperation between the JASU and National Pedagogical Dragomanov University. The result of the implementation of the principles of science education into educational practice of Ukraine will be the preparation of a generation of socially active youth in a society where scientific outlook and skills, creative and critical thinking will play more and more importance, resonating with the principles of sustainable development of humanity. At the same time, retraining programs will promote science education in the professional community of teachers.

The chair is going to be the center of research, teaching and lifelong learning activities in the field of science education in Ukraine. We've demonstrated, that science education is a pedagogical concept which aims to foster a new generation of young people, based on certain methodologies, methods, forms of learning and content. The teacher does not play the role of a single source of information for the purpose of passing it on to students, but is the mentor who oversees the student research complex. The end result of such learning (considering the European Commission Report "Science Education for Responsible Citizenship"), it should be a new type of student thinking when science is seen as a tool, a means to solve practical problems of a particular person, family, city, state, or more globally. It was demonstrated, that successful practices of JASU will receive additional scientific support being developed using the approaches of the famous international methodologies of science education (TheoPrax, LAMAP, etc.).

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