

*Valentyna Bilyk<sup>1</sup>**Lyudmyla Sushchenko<sup>2</sup>**Stanislav Strashko*

National Pedagogical Dragomanov University, Kyiv, Ukraine

## **Applying the co-working technology in the process of future psychologists' natural science preparation in Ukrainian higher educational institutions**

### **Introduction**

The need for dynamic qualitative changes in the system of future psychologists' science preparation in Ukrainian higher education institutions is caused, on the one hand, by modern society's demands for competent and highly qualified specialists, and on the other – reforms that take place in higher education system of the country in the context of its integration into global educational space, where, as our previous research (Bilyk, 2019) shows, the requirements for the training of future professionals, including future psychologists are no longer limited to mastering professional knowledge and mastering professional skills, and the priority is to form a comprehensive developed personality, creative and capable of innovative activity, self-improvement and self-development.

### **Analysis of relevant research**

Theoretical analysis of scientific sources on the current state of future psychologists' preparation in higher education institutions in developed countries, which is covered in detail in previous publications (Bilyk, 2019), shows that science preparation is important for its system as according to scientists, it promotes the development of critical and analytical thinking of psychologists student; increases motivation to learning and self-assessment of their own capabilities; formation of professionally oriented natural-scientific knowledge, skills and science competence in general.

At the same time, in the modern scientific society attention is focused on the problems of science preparation of future specialists in higher education institutions. In particular, scientists emphasise the need to improve its quality (Biletska, 2014);

---

1 Valentyna Bilyk- ORCID 0000-0002-6860-7728,

2 Lyudmyla Suchchenko- ORCID 0000-0002-2461-3739

on the expediency of integration of sciences (Omelyanenko, 2012); on the problems of unformed motivation of students-psychologists to study science (Audisio, 2011), on the place of information and communication technologies in its system and the search for new, more modern technologies in its organization (Gryniova, 2019).

### **Aim and tasks**

To substantiate the expediency and experimentally test the effectiveness of co-working technology in the organization of educational process of future psychologists science preparation in higher education institutions.

### **Research methods**

To perform the tasks there were used a set of methods: methods of analysis; pedagogical experiment (ascertaining and formative); methods of interpretation, synthesis and presentation of results; methods of mathematical statistics (statistical processing of data); prognostication.

### **Research Results and Their Discussion**

The incessant information variability in the field of science, the current need in preparation of highly competent, well-developed future professionals, as well as low motivation of students of psychology to study science (9.1%), which we found in the process of their questionnaires, need to find new, non-standard decisions in organisation of future psychologists science preparation in higher education institutions. We believe that one of the ways to solve this problem is to organize the educational process of future psychologists' science preparation in higher education institutions on the basis of innovation and heuristics.

In the process of theoretical analysis of scientific sources, we found that scientists have studied various aspects of educational innovation. For example, Khiminets, insists on the need to overcome «conservatism in approaches to educational activities and existing stereotypes in the thinking of its participants» (Khiminets, 2009), emphasizes that «only innovative education can prepare a comprehensively developed, self-sufficient person who is guided by his own knowledge and beliefs, he will be able to live in a modern globalized society» (Khiminets, 2009). Krivshenko emphasizes the need to provide innovative education with modern pedagogical technologies, the leading among which is «heuristic learning technology that combines heuristic dialogue between teacher and student» (Krivshenko, 2017). A similar view is held by Hencal. The scientist, in particular, believes that «heuristic learning in biological education should be represented in all components of the educational process» (Hencal, 2016), as its didactic capabilities «enhance learning efficiency, provide cognitive motives, strong knowledge and competence creative activity of the individual during the study of biology, during self-education and during the application of acquired knowledge in practice» (Hencal, 2016). In addition, the scientist also emphasizes that in the methodology of teaching biology, «innovative

technologies, including heuristics, are not often used by teachers of higher education institutions» (Hencal, 2016).

Taking into account the above mentioned, we believe that for organization of the educational process of future psychologists' science preparation on the basis of innovation and heuristics there is an urgent need to identify ultra-innovative pedagogical technologies that meet the requirements of time, that will motivate students and improving the quality and efficiency of scientific preparation.

In this context, we would like to note the fact that in the realities of applying a large number of pedagogical technologies and teaching methods in higher education institutions, there is no common and unambiguous opinion of scientists on the criteria that influence their choice. Therefore, taking into account the above conclusions of scientists on the research problem, and the experience of their own pedagogical activities, we believe that for the organization of educational process of science preparation of future psychologists in higher education on the basis of innovation and heuristic pedagogical technologies it would be effective both tactics of organization and educational activities.

Such pedagogical technologies include co-working technology.

Let's analyze it in more detail.

Theoretical analysis of scientific sources has shown that co-working (from the English. Co-working – working together) – is a relatively new concept of organization of activities, that has its own specific features for each area. It is important for us to find out the preconditions that contributed to introduction of co-working technology in the educational environment, its opportunities, advantages and disadvantages. In this context the results of scientific research by Babych's (2014), Gromushkina's (2016), Mayasova's (2018) and Khalmirzaeva's (2018) are significant for us.

Let's try to present it in thesis. Thus, Mayasova emphasizes that the introduction of co-working technology in educational environment is due to the need to expand the proposals for the growing demand for research and design learning technologies; popularization of such areas of education as science and technology; improving the quality of education (Mayasova, 2018). Such scientific views are shared by Khalmirzaeva, who interprets co-working technology as a way of organizing the educational process, which aims at creating an informal genetically open to innovation and experimentation interdisciplinary environment, argues that this technology can become a leader in innovative development of higher education, as it provides participants of the educational process with more space, opportunities and time (Khalmirzaeva, 2018).

A thorough analysis of Khalmirzaeva's scientific work on how to apply co-working technology made it possible to find out that the scientist describes several options, namely the creation of: a) external research and educational co-working; b) hybrid co-working; c) internal educational co-working. The scientist pays special attention to the expediency of introducing internal educational co-working in higher education institutions. Khalmirzaeva believes that they should be carried out on a permanent basis both long-term, for example, to ensure the educational process:

conducting lectures, seminars, practical and laboratory classes, and short-term - to conduct workshops, courses, trainings (Khalimirzaeva, 2018 ).

Babych agrees with the above views, but still emphasises benefits of co-working such as: the formation of a community of interests, the opportunity for its members to constantly exchange ideas and experiences, professional growth, mutual assistance in projects, emphasizes its shortcomings , namely: the cost of time and money on the way to the co-working center and back, minor events that may arise and divert attention from solving the main tasks of cooperation in the absence of control «from above» (Babych, 2014).

According to Gromushkina's, the following should be an indicator of the effectiveness of co-working technology in the educational process of a higher education institution: a high level of formation of students' subject and communicative competencies; their adaptation to professional activity; ability to objectively self-assess one's own capabilities; developed corporate culture (Gromushkina, 2016).

Within the framework of our research we will interpret co-working technology as a modern pedagogical technology which results in the creation of an open science-oriented research and educational co-working space based on informal cooperation of research institutions, higher education institutions, departments (faculties, institutes) within one institution of higher education, institutions of professional practice, informal real and virtual cooperation of scientists, including foreign, science, medical, pedagogical and other fields, teachers-practitioners, practicing psychologists, students-psychologists, the coordination center of which is located at the department, whose teachers carry out science preparation of future psychologists in a specific institution of higher education.

Representing such co-working technology for the organization and implementation of science preparation of future psychologists, we hypothesize that it will be able to combine into a single plane educational services provided in higher education institutions of Ukraine and in the world, modern scientific advances in science and future practical activities of students-psychologists, which will help to overcome their negative attitude to science preparation, increase motivation in the process of learning science and formation of a high level science competence.

To determine the effectiveness of co-working technology in the process of conducting science preparation of future psychologists in higher education institutions and testing the hypothesis, we conducted a pedagogical experiment involving 538 student psychologists (we believe that the presence of a large sample of students helps to identify and regularities and reliability of the results of experimental research work).

During the organization of pedagogical experiment we formed control and experimental groups of students. In the experimental groups the author's method of science preparation of future psychologists with the use of co-working technology was fully realized, in the control groups the teaching of science disciplines was carried out traditionally. To ensure the reliability of the results of experimental work, we checked the absence of statistically significant differences between the initial level of scientific knowledge of students in the control and experimental groups. Entrance testing was performed for this purpose. Fisher's  $\varphi^*$  -test was used to

process its results (Yermolaiev, 2002). For experimental work, groups of students were selected in which the empirical value of Fisher's  $\varphi^*$  criterion is in the zone of insignificance, i.e. the difference in the number of students who successfully passed the test is insignificant. Groups in which the empirical value of Fisher's  $\varphi^*$  criterion is in the zone of significance, i.e. success rates differ significantly, did not participate in the experiment. Groups in which the quality of training was higher according to the test results were selected as control, groups with lower quality – as experimental.

The experimental study was conducted in four higher education institutions in Ukraine and provided an analysis of the dynamics of future psychologists science competence levels formation (high, medium, low) in control and experimental groups by need-sense, cognitive-intellectual, functional-competence, personality-personality reflexive-analytical criteria.

Processing of experimental data was carried out by methods of mathematical statistics, which allowed to ensure the reliability of the experimental results.

We present the results of the study.

To assess the formation of the need-sense component of science competence, the attitude of students-psychologists to science disciplines, their motivation for learning and future professional activity was studied. In order to determine the attitude of students to science after the formative experiment, a questionnaire was conducted using the same questionnaires as at the ascertainment stage. As a result of the survey it was found that the number of student psychologists with a high level of science competence according to this criterion increased by 6,5% in the control and 11,81% in the experimental groups; with an average level of formation of science competence – by 10,57% in the control and 18,11% in the experimental groups; the number of future psychologists with a low level of science competence decreased by 17,07% in the control and 29,92% in the experimental groups.

To assess the formation of cognitive-intellectual component of science competence, testing of students' academic achievements was carried out in Moodle. It was taken into account that students-psychologists study sciences during the first, second and third year of study in a higher education institution with the level of science knowledge formed in the secondary school. In view of this, at the ascertaining stage of the experiment, in order to determine the initial level of science knowledge, students of the control and experimental groups were offered tests for input control. After studying the science, students performed tests for final control, which include closed tasks to choose one or more correct answers. Such tests make it possible to most fully cover the content of the discipline and assess the entire amount of knowledge formed. The results of the analysis of the obtained data indicate an increase in the number of student psychologists with a high level of formation of science competence by cognitive-intellectual criteria by 5,69% in the control and 11,81% in the experimental groups; with an average level – by 8,13% in the control and 13,39% in the experimental groups; the number of future psychologists with a low level of formation of science competence decreased by 13,82% in the control and 25,2% in the experimental groups.

Assessment of the formation of the functional-competence component of science competence was carried out based on the results of students' performance of

laboratory and practical works and tasks for independent work developed by us during the research. We found that according to the functional-competence criterion, the number of students-psychologists with a high level of formation of science competence increased by 5,38% in the control and 10,24% in the experimental groups; with an average level – by 6,92% in the control and 12,6% in the experimental groups; the number of future psychologists with a low level of science competence decreased by 12,31% in the control and 22,83% in the experimental groups.

According to the results of determining the personal (emotional and volitional) qualities of students-psychologists, their distribution was carried out according to the levels of formation of the personal-regulatory component of science competence. The obtained results give grounds to assert that according to the personal-regulatory criterion the number of students-psychologists with a high level of formation of science competence increased by 5,69% in the control and by 10,63% in the experimental groups; with an average level – by 7,93% in the control and 15,55% in the experimental groups; the number of future psychologists with a low level decreased by 13,62% in the control and 21,18% in the experimental groups.

The level of reflection was determined by the method of Karpov and Ponomaryova (2005). As a result of the survey, it was found that the number of students-psychologists with a high level of science competence increased by 4,88% in the control and 8,66% in the experimental groups according to the reflexive-analytical criterion; with an average level – by 5,69% in the control and 13,39% in the experimental groups; the number of future psychologists with a low level of formation of science competence decreased by 10,57% in the control and 22,05% in the experimental groups.

Based on the analysis and generalization of the results of experimental work, we formulate conclusions.

## Conclusions

Thus, conducting a pedagogical experiment revealed the dynamics of changes in the level of formation of science competence in students of control and experimental groups. Its generalized results according to all defined criteria showed the following tendencies to change: the number of future psychologists with a high level of science competence increased by 5,69% in the control and 10,55% in the experimental groups; the number of students-psychologists with an average level of formation of science competence also increased by 8,46% in the control and 16,22% in the experimental groups; the number of students with a low level decreased by 14,15% in the control and 26,77% in the experimental groups.

Thus, the analysis and generalization of the results of the pedagogical experiment allowed to confirm the effectiveness and efficiency of the use of co-working technology in the implementation of future psychologists' science preparation in Ukrainian higher education institutions.

Prospects of further research

We see prospects for further research in the development of modern educational and methodological support for co-working technology and the search for new modern technologies for science training of future professionals.

## References

- Audisio E. 2011. *Aportes de la biología molecular y celular a la formación del psicólogo*. III Congreso Internacional de Investigación y Práctica Profesional en Psicología XVIII Jornadas de Investigación Séptimo Encuentro de Investigadores en Psicología del Mercosur. Buenos Aires: Facultad de Psicología: Universidad de Buenos Aires, 101–102.
- Babych S., Parkhomenko V. 2014. Co-working: concept and perspectives. *Science and Innovation*, 6, 136, 42–47.
- Biletska H. 2014. Criteria, Indicators, and Levels of Natural Science Competence of Prospective Ecologists. *Education and Pedagogical Sciences*, 2, 19–24.
- Bilyk V., 2019. Organizational and pedagogical fundamentals natural science of future psychologists' scientific preparation in education institutions of the United States of America. *Pedagogical Sciences: Theory, History, Innovative Technologies*, 3 (87), 165–176.
- Bilyk V. 2019. Specifics of future psychologists' natural science preparation in higher institutions of Canada. *Bulletin of the T.H. Shevchenko National University «Chernihiv Colehium»*, 2 (158), 291–297.
- Hencal S. 2016. The didactic possibilities of heuristic learning at biology lessons in specialized classes. *Pedagogical Sciences: Theory, History, Innovative Technologies*, 3, 300–307.
- Gryniova M. 2019. Resource-oriented learning of students in a healthy educational environment. *Information Technologies and Learning Tools*, 72, 4, 182–193.
- Gromushkina T. 2016. Training co-working station. Technologies of the future: web-site. URL: [http://newtech.educom.ru/files/pdf/2016-02-08\\_02-17-02-623.pdf](http://newtech.educom.ru/files/pdf/2016-02-08_02-17-02-623.pdf) (Last accessed: 30.05.2020).
- Karpov A., Ponomaryova V. 2005. *Methods of diagnostics of reflexivity*. M.: Institute of Psychology Publishing House, s. 352.
- Krivshenko L. 2017. Heuristic learning: essence and semantic characteristics. *Volodymyr Vynnychenko Central Ukrainian State Pedagogical University «Academic Commentaries. Series: Pedagogical Sciences»*, 159, 219–225.
- Mayasova T., Lekomtseva A., Fedyanina S. 2018. The prospect of implementing co-working in distance learning on the example of the system of additional education of children. *Modern High Technology*, 7, 204–208.
- Omelyanenko V., 2012. The Integration of Natural-Science Disciplines Content as a Condition of Forming Health-Preserving Competence of the Future Physical Training Teachers. *Fizichne Vihovannya, Sport and Healthy Culture at an Instant Suspension*, 4 (20), 97–102.
- Yermolaiev, O. 2002. *Mathematical statistics for psychologists*. Moskva: Moskovskii Psikhologo-Sotsialnyi Institut : Flinta, s. 336.
- Khalmirzaeva E. 2018. Educational co-working and features of its functional zoning. *Bulletin of KSUST*, 2, 36–44.
- Khiminets V., 2009. *Innovative educational activities*. Ternopil: Mandrivets.



## Zastosowanie technologii co-workingowej w procesie przygotowania przyszłych psychologów nauk przyrodniczych w ukraińskich uczelniach wyższych

### Streszczenie

Podkreśla się, że konieczność zbadania możliwości wykorzystania technologii podczas organizacji i przebiegu procesu kształcenia przyszłych psychologów w instytucjach szkolnictwa wyższego na Ukrainie wynika z zapotrzebowania współczesnego społeczeństwa na kompetentnych i wysoko wykwalifikowanych specjalistów, niskiej motywacji studentów psychologii do studiowania i do reform, które obecnie mają miejsce w systemie szkolnictwa wyższego kraju w kontekście jego integracji ze światową przestrzenią edukacyjną. Technologia będzie mogła połączyć w jedną płaszczyznę usługi edukacyjne świadczone w ukraińskich i światowych szkołach wyższych, nowoczesne postępy w nauce i przyszłe praktyczne działania studentów psychologii, które pomogą przezwyciężyć ich negatywne podejście do nauki, zwiększenie motywacji w procesie kształcenia w różnych dyscyplinach naukowych oraz kształtowanie wysokiego poziomu kompetencji naukowych.

Należy zauważyć, że eksperyment pedagogiczny ujawnił znaczącą pozytywną dynamikę zmian poziomu kompetencji naukowych uczniów w grupach eksperymentalnych w porównaniu z grupami kontrolnymi w zakresie kompetencji rozumowania, poznawczych i intelektualnych, oraz potwierdza skuteczność i wydajność wykorzystania technologii podczas przygotowania przyszłych psychologów w szkołach wyższych na Ukrainie. Przedstawiono perspektywy dalszych badań, które polegają na rozwoju nowoczesnego wsparcia edukacyjnego i metodologicznego technologii oraz poszukiwaniu ultranowoczesnych technologii przygotowania naukowego przyszłych specjalistów.

**Słowa kluczowe:** technologia współpracy, przyszli psychologowie, ukraińskie instytucje szkolnictwa wyższego.

### Abstract

It is emphasized that the necessity to study the feasibility of co-working technology during organization of educational process of future psychologists science preparation in higher education institutions in Ukraine is caused by modern society's demands for competent and highly qualified specialists, low motivation of psychology students to study science and reforms that currently take place in the higher education system of Country in the context of its integration into the world educational space. It is stated that co-working technology will be able to combine into a single plane educational services provided in Ukrainian and world higher education institutions, modern scientific advances in science and future practical activities of psychology students, which will help overcome their negative attitude to science preparation, increase motivation in the process of teaching science disciplines and formation of a high level of science competence.

It is noted that the pedagogical experiment revealed a significant positive dynamics of changes in the level of students' science competence in experimental groups in comparison with the control on the need-sense, cognitive-intellectual, functional-competence, personality-regulatory, reflexive-analytical criteria and it confirms the effectiveness and efficiency of the use of co-working technology during implementation of science preparation of future psychologists in higher education institutions in Ukraine. The prospects of further research, which consist in the development of modern educational and methodological support of co-working technology and the search for ultra-modern technologies of science preparation of future specialists, are outlined.

**Key words:** co-working technology, future psychologists, Ukrainian higher education institutions.