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## USING COMPETENCY-BASED INTERGATED APPROACH FOR PROFESSIONAL TRAINING OF FUTURE BIOLOGY TEACHERS

I. Fursa, L. Bakhmat

*The article deals with defining competency-based integrated approach in professional education, which is aimed at improving existing pedagogical systems and stimulates integration activity of modern educational institutions. When accomplishing a single strategy of professional students training, the idea of integrating personal, social and action aspects plays an important role. It stimulates coordinating the contents of subjects (outer integration) and forming integral features of a future professional personality (inner integration).*

**Key words:** *Competency-based integrated approach, professional training, future biology teachers, inner integration, outer integration.*

**Problem.** At the time of higher education reforming and modern challenges, the problem of solving concept changes of education contents arises in order to advance quality professional training. The problem of improving training of pedagogical staff, especially biology teachers, is of particular importance. It's biology teachers who form world outlook understanding, teach rules of rational lifestyles in crisis, develop socially based behavior reactions aimed at health protection and existing biorisks escape. The problem's solving is possible by using various innovative approaches when educating students of biology. Organizing studies on the basis of integrated approach is an essential condition of improving professional training of future biology teachers.

The integrated approach is a recent phenomenon in the methodology of pedagogy. It's connected with the name of Ken Wilber who introduced the term in 1977. The integrated approach means integration of education contents (knowledge about reality, nature; in a certain specialty, course, chapter, topic, etc.) thanks to systemizing elements of different sciences and their complex use.

Today there is lack of coordination between possibilities of the integrated approach and its real realization in higher school practical work.

Realization of the integrated approach in professional education is an actual problem, because new prospects of forming competitive, developed and creative personality appear along with its successful methodical use. The integrated approach use leads to activization of mental and search activities of students, stimulates its systematic and undivided understanding, creates an interest in getting professional knowledge as well as is a main factor of future biology training.

**The latest research and publication analysis.** In modern pedagogical theory and practice, the problems of the integrated approach are studied through conceptual foundations to applying the integrated approach in education (V. Zagviazytsky [6]); integrational processes as a social and pedagogical problem of increasing education quality (I. Lapychak [12], L. Sydorhuk [15] and others); applying the integrated approach in practice of professional training of science specializations (N. Kuznetsova [10], N. Kurylenko [11], M. Shatalov [10] and others).

**The purpose of the article** is to define the essence of the competency based integrated approach in professional training of future biology teachers.

**Main information outline.** V. Ilchenko details the analysis of current researches in «Encyclopedia of Education» pointing at wide use of the integrated approach and its detailed studies around the globe. To be exact, in Russia the integrated approach is analyzed by researchers from Saint-Petersburg (I. Aleksashina), Moscow (Yu. Pentin). In the U.S. the integrated approach is studied in California University of Integral Researchers. Maryland University (Baltimore County) coordinates the ESIP Project (Elementary Science Integration Project) aimed at studying integral scientific processes. In Ohio there is The Association for Integrative Studies – AIS, established to share ideas among researchers and administrators in all science and art branches concerning integral studies. The International Center of Transdisciplinary Studies functions in Paris and its main purpose is to define the essence and features of information torrents in different science branches [4, p. 356].

V. Zagviazytsky believes that the integrated approach in education is based on the education unity clear in unity of aims, contents, means, forms and study methods [7, p. 53]. M. Pak is sure that the integrated approach is a particular methodological approach with «certain views» on educational process with the core of integrating contents and study methods [13, p. 7].

All in all, the integrated approach in pedagogy is considered as a methodology of general sciences based on which new complex pedagogical systems and subsystems are developed. The integrated approach responds

philosophical views on the whole, but not as a sum of parts but as a new feature on account of changing connection means of the structure elements. It enables creating a system of different parts as a united set of interconnected elements and is an organic whole.

I. Lapychak notes that important psychological preconditions of integrating knowledge and skills are principles of uniting conscience and activity, complex of social and biological human nature. Psychological foundations of knowledge and skills integration are the components of essence and process structure. At certain stages of knowledge acquisition process there is a different character: from simple repetition to deep understanding and the ability of creative use shown at different levels of knowledge acquisition. To effectively control the process of knowledge and skills acquisition, it is important to understand the general structure of the process, its main components, interconnections. The processes of acquisition and understanding, memorization and systematization is an inseparable part of establishing united knowledge and skills [12, p. 21-22]. Complex psychological processes about thinking and memory development is at the core of the integrated approach.

For our study, positions on the definition of a conceptual component of the integrated approach are significant. Foreign integrated and educational concepts of L. Sydarchuk are conventionally divided into two groups. The first group includes concepts studying integration processes reflected in their names. Among them, the scientist finds the concept of educational social forces integration; internal integration of pedagogical knowledge; integration pattern of education; synthesis of teaching; integration of general and professional education; integration of educational institutions. The second group has an educational and teaching concept, with no outer element, but implicitly studies their characteristics and is the outcome of the implementation. L. Sydarchuk lists the concept of cultural and educational center; concept topographic education; integrated concept in modern German school pedagogy; the concept of humanitarian and educational center, etc. [15, p. 216].

Among Ukrainian concepts, L. Sydarchuk analyzes the concept of intra-subject integration of pedagogical knowledge by V. Zagviazynsky [5], the concept of education integration by H. Serikov, the concept of general and vocational education integration by M. Berulava et al.

The conclusion of the scientist is important for our study: «Integrated and pedagogical concepts which condense a rich set of integration tools can be used as technological and methodological and solely technological tools

of implementing integrated and pedagogical activities and can generate integrated and pedagogical technologies on the basis. First of all, it concerns the concept of vitagene training with the holographic project method, which requires the use of the most integrationally intensive pedagogical technologies and the implementation requires educational and problematic, context, modular training and others» [15, p. 217].

Along with the vitagene training, other well-known integrated pedagogical concepts we can distinguish those that via the subject have its integration processes directly, including: the concept of educational society forces integration (Yu. Brodsky, V. Semenov); the concept of didactic system synthesis (L. Artemyeva, V. Havrylyuk, M. Mahmutov); the concept of general and professional education integration (M. Berulava, Yu. Tyunnykov); the content of integrating primary professional education (L. Fedotova); the concept of integration and differentiation forms of learning (I. Ibrahimov) and others.

Thus, modern pedagogical theory has a number of developed integrative pedagogical concepts used as technological tools of implementing integration and educational activities. Integration is not only in knowledge but also at the level of technology.

However, in practical terms the integrated approach is most often realized in the study of integrated courses or individual subjects in the educational sector where knowledge complex is formed by integration based on common concepts, applying methods and forms of education, monitoring and correcting academic achievements of students. This is takes place on interdisciplinary approaches.

O. Voznyuk notes that in Ukrainian pedagogy based on the integrated approach, the concept of integrated science education has been developed as well as theoretical and methodological foundations of shaping the content of the educational subject «Sciences», the system of teaching complexes (programs, tutorials, manuals for students and teachers) along with studying theoretical and methodological foundations of integration and their implementation in the content of the educational process and professional education. The author identifies areas where specializations are combined: close science and liberal arts: mathematics, language and history; various science subjects; theoretical (fundamental) and applied science; sciences and liberal arts humanities; science and society subjects; foreign languages and their cultural environment [1, p. 180].

Thus sciences can be combined with liberal arts, applied and other social sciences. In our opinion, combining theoretical and applied, and

natural and educational sciences is particularly important in the training of future biology teachers. We can justify the need for such integration by increase of practical component of future biology teachers training and development of teaching skills to organize the academic process of mastering biological knowledge of school pupils.

Science integration is common in high school. Modern schools need professionals with an integrated knowledge of sciences. However, in most educational institutions biology students are trained traditionally on the basis of subject training. In the opinion of I. Lapychak, today the problem of the optimal combination of objective and integrative learning in professional training, which is to find effective ways of forming tools multi-subject knowledge of high educational and professional training, is relevant. Subject training system, as the author points out, has a number of positive features (clear organization and systematic nature of pedagogical process, dynamic type).

Definitely, it would be inappropriate to lose them during reformation. Along with the advantages, there are certain disadvantages (artificial division of the united knowledge system of certain subjects that are normally inconsistent with each other, a great many subjects, duplicate content, failure to provide holistic nature of education, etc.). Integrative learning is based on scheduled educational tasks, content of multi-subject knowledge complexes using integrative forms and methods [12, p. 22]. We fully agree with the opinion of I. Lapychak on combining objective and integrative learning in professional training.

To solve this problem, in professional training of science disciplines, including biology, integrated courses development optional for students to encourage scientific and methodical training for future professional integration is required. Modern training of biology students of specialty in pedagogical institutions is carried out in two stages: Bachelor and Master.

In this regard, we face the task of developing educational and professional science programs for bachelors and masters to have competencies necessary for future professional activities. Competences of a pedagogical institution graduate can be divided into core and professional. Each competency is formed with a set of disciplines grouped into relevant modules. Each training cycle has basic (compulsory) and variable (optional) parts defined by university. The latter enables expansion and deepening of knowledge, skills and competencies that define content of basic subjects (modules), allows students to gain in-depth knowledge and skills for

successful professional activities or continue aftergraduate professional education.

The author agrees with the opinion of L. Korolyova, M. Korolyov, O. Petrova that «integration implementation in sciences will help resolve contradictions between the increasing amount of knowledge and studying periods.

Required courses in which content is systemized through targeted implementation of integration ties which reflect the science integration trend. Integration connections are the basis of building a scientific outlook, help to see the world in motion and development, help to establish logical connections between concepts, thus developing logical thinking» [9, p. 3].

The integrated approach is interconnected with other methodological approaches. Today the use of double methodological approaches has become common in pedagogy. Thus, in chemistry teaching N. Kuznetsova and M. Shatalov introduced the use of problem-integrated approach [10]. N. Kurylenko uses the same approach in teaching physics for forming ecological competence in secondary school pupils [11].

In the first and the second studies the scientists operate with the following principles of the educational process: the principle of interdisciplinary integration that provides systematic and purposeful implementation of the interdisciplinary connections as the main mechanism of integrating knowledge and ways of action in education and advanced drafting method of problem situations, formulation and solution; liabilities of interdisciplinary educational problems; the principle of unity of internal and interdisciplinary knowledge integration and action modes that provides the dialectical unity and interrelation of internal and inter-subject relations in teaching; the principle of horizontal and vertical coordination of dynamics and learning during each academic year (horizontally) and consistency (coordinated actions) in the transition from one school subject to another (vertical) [10; 92].

L. Dolnikova substantiated the view that structuring sciences content based on the integrated and differentiated approach. To implement the approach in practice, the author defines the outline of integrative structural and logical flowchart broadcast by document textbook material, forming basic integrative teaching units using generalized tables. When integrating the content of sciences with horizontal (promotes and forms a number of important qualities of thinking, significant for professional knowledge development) and vertical structuring (according to ability and level of basic knowledge), which significantly increases students' motivation when

learning sciences and their work [2]. So, scientists such as L. Dolnikova, N. Kurylenko, N. Kuznetsov, M. Shatalov agree on importance of using horizontal and vertical structuring for sciences content integration.

I. Pastyrskaya summarizes and highlights the characteristics of sciences content integration in the 20 - 21 centuries: innovative approaches to creating integrative thinking; development of integrated science education concepts; the formation of readiness classroom introduction to sciences integrative approach in education; structuring the content of science-based integrative and differentiated approach; the modular design of dynamic structure based learning content integrated sciences; knowledge integration by means of modern information technologies; implementing integrated subjects and integrated training courses; modeling integrative study of natural and mathematical subjects in different types of schools [14, p. 246]. Among the features of sciences content integration the author emphasizes the use of integrative and differentiated approach as well as L. Dolnikova does. Consequently, various scholars (H. Ball, L. Dolnikova, N. Kurylenko, N. Kuznetsov, I. Pastyrskaya, M. Shatalov et al.) used the integrated approach combining other approaches in their studies. This fact shows that the integrative and the intersubject are inherent in many methodological approaches.

In our study we mark the important comment done by S. Ignatov and V. Ignatova: «However, nowadays the integrated school subject didactics are still a poorly developed branch of pedagogy. Those approaches to integration discussed today in the scientific and educational literature are mainly related to empirical level and reduced mainly to the convergence of the knowledge from different subject areas, the use of subsidiarity principle of and, at best, to the coordination of teaching the subjects. The cause of unsystematic, chaotic randomness and use in education is the fact that theoretical and methodological framework is not developed. It is contrary to the requirements of modern education, a need to move it to a competency model that promotes personal formation with a wide scope and profound professional skills» [8, p. 104-105].

The statement by A. Dubasenyuk and A. Voznyuk coincides with the previously discussed quotation. The consideration of the integrated approach to professional development of individual teachers in terms of global changes distinguish three common areas of educational research related to the three main goals of education: 1) a harmoniously developed personality as the person of social and personal values; 2) a patriotic citizen; 3) a highly-

skilled specialist [3, p. 18]. Therefore, the authors associate the competence and the integrated approaches.

Today the use of the competency-based approach in qualified teachers training in higher education is very important for professionals; it requires constant updating of knowledge and skills to resolve various professional tasks effectively, ability to work in a team, demonstrate initiative and creativity. The main idea of the competency-based approach is a permanent way to professionalism, which aims at the integrated mastering of different skills and practice ways by mastering appropriate competencies, self-realization in different areas of their own professional activities, acquiring social independence.

Thus, based on the analysis in the course of our research, the competency-based integrated approach is used as comprehensive.

**Conclusion.** The competency-based integrative approach combines conceptual nature of these two approaches in our study. The competency-based approach makes innovative changes in shaping the content of future biologists training, specifying disciplines and reducing a number of professional educational programs and curricula, identifying the key and professional competences of future specialists. The integrated approach demonstrates that forming personal qualities of future biology teachers is based on the association in certain parts of the whole training. Integration is displayed in the integrated content, forms, methods and technologies of future biology teachers training for their professional work. The competency-based integrated approach aimed at improving quality of existing educational systems and creates the innovative type of modern education. It helps to create the atmosphere of innovation and creative interaction between the participants, promotes the formation of future teachers to implement the innovation in terms of the educational scope. The implementation of a unified strategy for students training should be based on the idea of integrating personal and social aspects and activities that promote the coordination of subjects content (external integration) and the formation of the integral characteristics of future specialist personality (internal integration).

– So, the present stage of social development is characterized by integrating various sciences in order to obtain a more accurate picture of the whole picture of the world. The integrative approach in pedagogy is considered a general scientific methodology on which the integral educational systems and their subsystems are formed. Thus, in theory and practice of higher school there is a tendency towards disciplines integration,

enabling students to achieve interdisciplinary generalizations and complex rapid assimilation of educational material. Integration is highly important in teaching science, methods are used in many fields of knowledge and human activity. The competency-based integrated approach that aims to gain knowledge, skills and experience in school and the integration of content, forms, methods and technologies of science and pedagogical disciplines plays an important role in future biology teachers training.

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#### ВИКОРИСТАННЯ КОМПЕТЕНТІСНО-ІНТЕГРАТИВНОГО ПІДХОДУ У ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ УЧИТЕЛІВ БІОЛОГІЇ

I. В. Фурса, Л. В. Бахмат

*У статті визначено, що компетентісно-інтегративний підхід у професійній освіті спрямований на якісне вдосконалення існуючих педагогічних систем і спричиняє інноваційний тип діяльності сучасних навчальних закладів. Доведено, що при реалізації єдиної стратегії професійної підготовки*

студентів важливе місце відведено ідеї інтеграції особистісних, соціальних і діяльнісних аспектів, що спонукає до координації змісту навчальних дисциплін (зовнішня інтеграція) і формування інтегральних характеристик особистості майбутнього фахівця (внутрішня інтеграція).

**Ключові слова:** компетентнісно-інтегративний підхід, професійна підготовка, майбутні учителі біології, внутрішня інтеграція, зовнішня інтеграція.

### КОМПЕТЕНТНОСТНО-ИНТЕГРАТИВНЫЙ ПОДХОД В ПРОЦЕССЕ ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКИ БУДУЩИХ УЧИТЕЛЕЙ БИОЛОГИИ

И. В. Фурса, Л. В. Бахмат

*В статье определено, что компетентностно-интегративный подход в профессиональном образовании направлен на качественное совершенствование существующих педагогических систем и стимулирует инновационный тип деятельности современных образовательных учреждений. Доказано, что в процессе реализации единой стратегии профессиональной подготовки студентов важное место занимает идея интеграции индивидуальных, социальных и деятельностных аспектов, побуждая к координации содержания учебных дисциплин (внешняя интеграция) и формированию интегральных характеристик личности и будущего профессионала (внутренняя интеграция).*

**Ключевые слова:** компетентностно-интегративный подход, профессиональная подготовка, будущие учителя биологии, внутренняя интеграция, внешняя интеграция.

**Фурса Ірина Валеріївна** – викладач кафедри природничих дисциплін Комунального закладу «Харківська гуманітарно-педагогічна академія» Харківської обласної ради (м. Харків, Україна). E-mail: iryna91fursa@mail.ua

**Fursa Iryna Valeriyivna** – Lecturer of the Natural Sciences Department of the Municipal Institution «Kharkiv Humanitarian-Pedagogical Academy» of Kharkiv Regional Council (Kharkiv, Ukraine). E-mail: iryna91fursa@mail.ua

**Бахмат Людмила Володимирівна** – викладач кафедри іноземної філології Комунального закладу «Харківська гуманітарно-педагогічна академія» Харківської обласної ради (м. Харків, Україна). E-mail: mila.bakhmat@gmail.com

**Bakhmat Liudmyla Volodymyrivna** – Lecturer of the Department of Foreign Philology of the Municipal Institution «Kharkiv Humanitarian-Pedagogical Academy» of Kharkiv Regional Council (Kharkiv, Ukraine). E-mail: mila.bakhmat@gmail.com