

Розділ 1

АКТУАЛЬНІ ПРОБЛЕМИ ВИЩОЇ ШКОЛИ

CHAPTER 1

ACTUAL ISSUES OF THE HIGHER EDUCATION

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FUNDAMENTALISING HIGHER EDUCATION BASIC CRITERION OF TRANSFERRING TO THE NEW UKRAINIAN SCHOOL

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In the presented paper the normative pedagogical conception of fundamentalization of physics education as well as the categorical and conceptual apparatus of physics education is characterized; the main principles of modern Ukrainian and foreign approaches aimed at the achievement of high level of mastering of conceptual apparatus of physics and the psychological and pedagogical foundations of the organization of the professional training of future physicists are presented; the main components of the future specialists training under the conditions of fundamentalization of professional education are distinguished.

Key-words: *higher education, fundamentalization of the education, information technologies, CDIO-initiative, scientific and research competence.*

Introduction. In the context of the challenges that the modern labor market puts to specialists at all levels of training, education is the most important area of development. Forming the intellectual capital of the nation depends on its effectiveness as one of the main factors of the development and introduction of innovations, which in its turn creates the basic conditions for the quick upgrading technologies. In the current conditions, the fundamentalization of the education is one of the most significant factors in improving its quality.

In the Memorandum of the UNESCO International Symposium «Fundamental (Natural Sciences and Humanities) University Education» (Moscow, 1994) it is stated that a fundamental holistic natural sciences and humanities education, designed to play a key role in shaping the personality and ensuring sustainable development of the society, requires to be interpreted as an independent and the most important branch of the intellectual activity: it is extremely important to attract the attention of the world scientific and cultural community to the problem of creating the intellectual grounds of modern education system, to developing scientific research of logic, methodology, philosophy, history, sociology and psychology of science and developing modern teaching techniques in the fundamental education; the need to form the common educational space within the international community can be achieved by developing common approaches to the international educational standards, requirements for the fundamental education (*Memorandum mezhdunarodnogo simpoziuma YuNESKO, 1994*).

The high quality of the fundamental education is a strategic national resource, the main competitive capital, one of the grounds of the sustainable, dynamic development of the society. In the

modern conditions, it is necessary not only to have constant accumulating, but also renewing the capital, forming the personal mechanism of self-development. At present, the idea of «fundamentalization of continuous professional education» as the basis of the holistic education of a new quality, the necessity of which is determined by the complex of trends of the contemporary social development and the specifics of the development of education, has been updated.

An important problem in modern education is the optimal combination of the theoretical and practical mastering the professional activity, the solution of which is its fundamentalization. After all, fundamental education is not only mastering the theory, such education can not be fully identified with the theoretical one, since it has the inherent effect of systematization, which maybe serves as the basis for a consistent and truly effective increase in knowledge in the professional activities, contributes to the continuity of education and stimulates it, giving the ability to predict the future and to evaluate the development trends. The scientific and technological progress, which has reached a high pace, leads to fairly rapid losing the value of knowledge mastered by a student in the disciplines with the applied nature. This problem is especially important for computer engineering, where the life cycle of new the scientific results makes 1-2 years.

In the final phase of obtaining the scientific knowledge associated with the processes of integrating the fundamental and technological knowledge, not only the synthesis of scientific material is planned, but also its methodological awareness is ment. According to N. Sadovnikov (*Sadovnikov, 2011*), creating should be the main methodological integrative principle that unites the fundamental and technological branches of the scientific knowledge. The meaning of this principle in the science is to smoothly and unobtrusively (without any destroying), naturally enter the existing processes, creating on this basis such man-made artificial structures that would not ruin the conditions of the human existence.

The basis of this must be made of the competence approach that enables the free development of the personality of the intending physics specialist, the changing the indigenous educational institutions, transiting from the «knowledge-based» paradigm of education to the «developing» one, from the adaptive and reproducing model to the activity and transformational orientation of the professional education.

Aim. Updating the need for fundamentalising higher education as the basic criterion for the development of the natural sciences competence of the intending physics specialist - a teacher and a researcher.

Discussion. Competence-oriented education as a complex, multidisciplinary problem is characterized in the scientific literature mainly through the prism of the key concepts and mechanisms implemented in the psychological and pedagogical theory and practice of education. Despite this, there are no reliable investigations about its use in training intending specialists for the research activities. Modern conditions require not a model of narrow-profile training of a university graduate focused on the certain objects and labor tools, but an integrated type model, where the purpose, content and learning outcomes are formulated in a complex way, taking into account changes in future professional activities, and aimed at graduate's obtaining the broad socio-professional competence.

Forming the research competence takes place both through the development of competences of an invariant nature, which are manifested at all the levels of education, and due to the increase of specialized competencies, which for the first time appear at a certain stage of education.

Among the methodological approaches to forming scientific research competence the following ones are defined: systemic, personally oriented, activity, integrative-holistic, contextual, competence.

The analysis of modern foreign conceptual approaches to the development of physical and mathematical education gives grounds for differentiating between the two main ones: competence approach and CDIO-initiative (*Conceive – Design – Implement – Operate*) (*Crawley at al, 2014*). At present, the competence approach is being implemented, which combines the assessment of the competencies necessary for effective future work and forming the competences on separate subjects in the process of training on the basis of this assessment. Such competences continue to serve the functions of the specialized requirements, professional skills and knowledge. The problem aspect of

this model is the optimal comparison of the competences and the actual identification, assessment and development of the learning process stages. The end of the 20th century in engineering education is marked by emerging the original concept called «CDIO». The main idea of this concept is connected with attempts to overcome the critical gap that arose between the theoretical and applied components of training specialists. It is qualified as an innovative, results-oriented educational system for training the new generation of leading engineers. The idea is based on a simple approach - future engineers need to understand the essence of engineering processes, be able to make a scientific contribution to the development of engineering products, and working this way to develop as holistic, mature and thoughtful specialists.

The development of the CDIO-initiative is rather relevant for the Ukrainian educational environment. In Ukraine there is a problem of a critical gap that arose between the theoretical and applied components of training not only engineers, but also specialists in the natural sciences (physicists, chemists, etc.). Partly, such a gap is explained by the imperfect material and technical base of the educational institutions. Students work with morally and technically obsolete equipment. The other significant factor of such a gap is the lack, on the one hand, of the unified, and on the other hand - a flexible integral criterion of knowledge and skills of future specialists. Obviously, the absence of the criterion as a certain goal makes it impossible to speak about the development of optimal, well-adapted methods for its achievement, that is, about forming the successful educational sphere.

These two approaches to training research physicists serve as one of the means of its fundamentalization: the key principle of the concept of fundamentalization is the continuous integration of the scientific activities of future specialists on the basis of forming research and development competence.

Therefore, the general theoretical knowledge, characterized by the internal and external connections, which reflect the structure of the content and form the methodological base of the subject field «Physics», namely, the problems of teaching physics, should be updated in training the intending physics specialists. We can state (*Lucenko, 2013*) that nowadays there is practically no single opinion on the fundamental basics of the discipline of physics at the higher educational institutions, that is why this course has significant natural and applied orientation. However, it is known that deepening the technological orientation can not be free and universal, since it will inevitably lead to natural constraints generated by the absence or lack of the fundamental basis.

The analysis of the pedagogical and methodical literature (*Lucenko, 2013*) made it possible to formulate a set of conditions covering all the aspects of the professional education, taking into account the changing nature of the professional and creative training students for solving future tasks in the professional activity, the implementation of which optimizes the successful functioning of the training system of the intending specialist of the physics and mathematics profile in the conditions of the university.

The most important condition of forming creative personality of the future specialist in the process of the professional education at the university is forming professional-pedagogical orientation of the student's personality, motivating for creativity in future professional activities. The professional-pedagogical orientation of the intending specialist training at the university should be implemented primarily through the professionalization of teaching all the disciplines, scientific and educational work. M. Baidan (*Baydan et al, 1984*) described the pedagogical conditions contributing to the formation of students' creative activity in the process of research: the continuity and systematic participation of students in the research work, the influence of the researching teacher's personality, the connection of the students research work with the future professional activity, etc.

The development of the professional qualities of the intending physics specialist (physicist-researcher and physics teacher) involves the creative transforming the competences acquired in the process of learning various disciplines into their own pedagogical system. The process of the professional and pedagogical education of the intending specialist of the physics and mathematics profile must be built on the basis of the integrated approach, which helps to comprehensively analyze the phenomena of the pedagogical reality as a system, that is, basing on the interdependence and

structural and functional comparison of its elements. At the same time, subjects of different cycles are often taught without orientation on the future professional activities. Strengthening the professional orientation of natural sciences, it is necessary to focus the attention of future specialists on the fact that in their professional activity, special scientific knowledge will have to be rebuilt, synthesized with the conclusions of the other, in particular, pedagogical sciences.

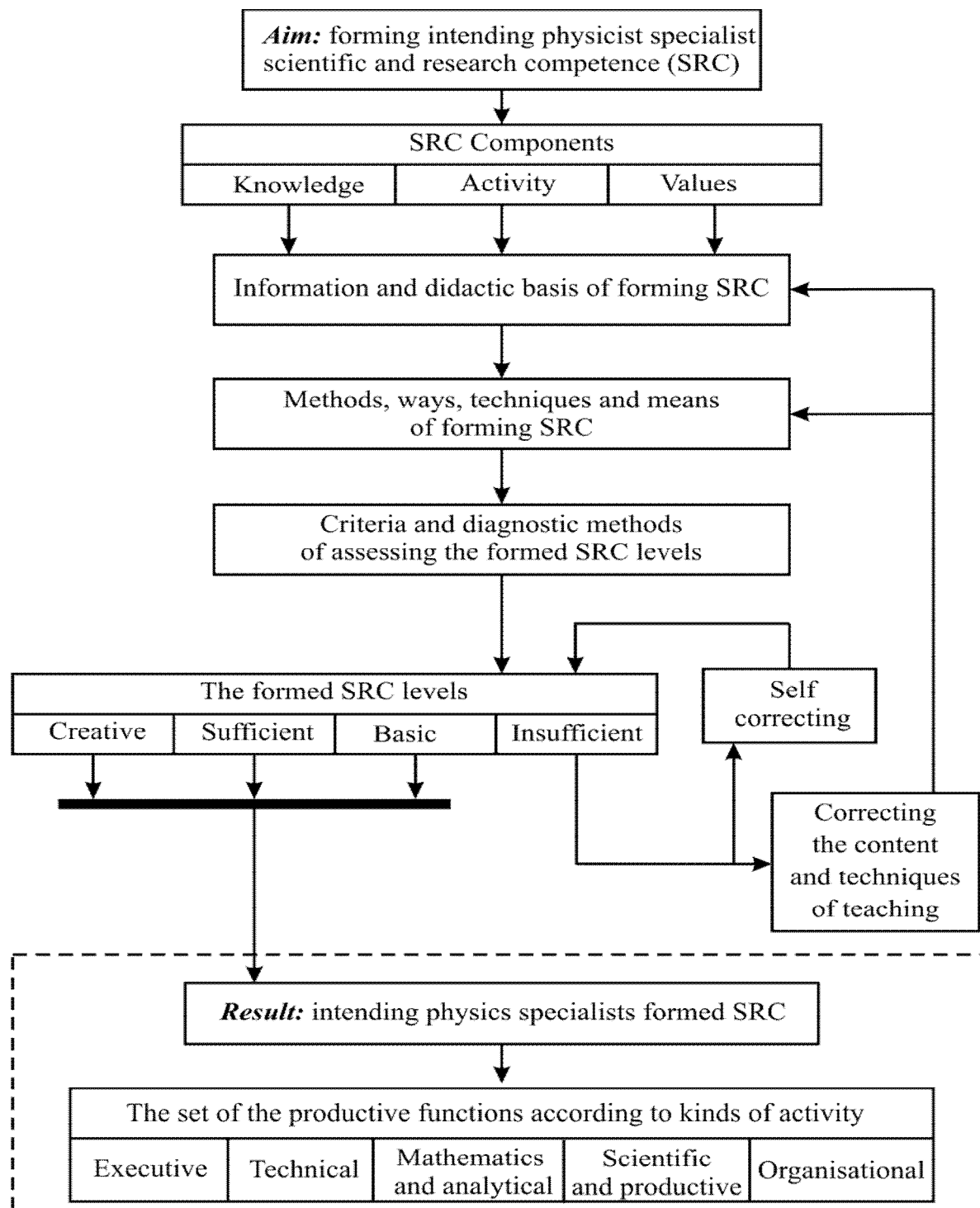


Fig. 1. Model of the pedagogical subsystem of forming intending physics specialists scientific and research competence

In connection with this, there is an urgent need for implementing the interdisciplinary

relationships of two types: scientific, content and functional. The first is the traditional connection of the educational subjects based on the similarity of the scientific and cognitive tasks located on the «interphase boundaries» of the interrelated disciplines: pedagogy and psychology, pedagogy and methods of teaching physics, and others. The second ones are the interdisciplinary connections, in which subjects are associated on the basis of their place and role in solving the practical teaching and educational tasks.

Training the intending specialist of the physics and mathematics profile for creative professional activities is associated with attracting students to active creative activity of the research character. At the same time, forming students research skills is more effective if the following conditions are met: 1) the system of student research activity must penetrate all the training sessions – theoretical and practical; 2) at all the stages of the educational and research work it is necessary to take into account the individual characteristics of students; 3) in order to ensure continuity in forming skills and abilities of research activities, it is necessary to provide the interrelated thematic unity of the student academic and research work at different grades.

Mass applying information and communication environment with the electronic content and possibilities of using scientific, educational and managerial resources in the development of the information and communication technologies in all the spheres of life will inevitably update the necessity of informatization of the educational process by wide introducing methods and means of information and communication technologies into the system of education, creating the computer-oriented course of solving various problems on this basis.

I. Karnaukhova states that the scientific and research activity as a means of the professional training enables the creative applying the educational material in practice and a smooth transition from the educational-cognitive to independent creative professional activity which is ensured by implementing the competent approach in the training of specialists (*Karnaukhova, 2001*).

Forming the scientific research competence requires the change of methods, forms and means of organizing the educational process and research activity of students. From this point of view, it is important for organizing students research work to select such teaching methods that help to most effectively form the above mentioned competence, in particular, interactive methods.

Conclusion. The conducted analysis gives grounds to offer the model of the subsystem of forming scientific and research competence of intending physics specialists (Fig. 1) as the constituent of forming physics researchers readiness to the professional activity.

The most important role in forming this competence of the research physicists is played by the course «Scientific research activity in Physics». Scientific work is an integral component of the educational activity of the higher educational institution. At the same time the process of globalization of the scientific and educational sphere requires the need of developing creative approaches to scientific research, exchanging new results, teaching undergraduates and Master degree students the fundamentals of the scientific research etc.

The requirements of the modern educational process encourage developing the new approaches to the technological constructing the educational process, updating the methods of training specialists in the field of physical and mathematical and engineering areas by way of the systematic implementing information and communication technologies. One of these new approaches is the virtual devices technology, which makes it possible to create systems of measurement, management and diagnostics for different purposes of virtually any productivity and complexity, in particular while implementing students research projects.

This enables the development of the research competence of the intending physics specialists, training a scientist. Thanks to the virtual remote labs developed in the LabView graphical programming environment, a student is allowed as a formally «inexperienced» scientist to working with the experimental devices to work with the modern equipment.

Thus, the obtained results of the study lead to the conclusion that profound fundamental training in the field of physics and informatics develops the physics specialist thinking, forms a stable values orientation to creative self-realization and self-development, helps the university graduates who chose the profession of physics researcher to become masters of their professional activity.

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ФУНДАМЕНТАЛІЗАЦІЯ ВИЩОЇ ОСВІТИ ЯК ОСНОВНИЙ КРИТЕРІЙ ТРАНСФОРМАЦІЇ ДО НОВОЇ УКРАЇНСЬКОЇ ШКОЛИ

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Постановка проблеми. У статті схарактеризовано базову педагогічну концепцію фундаменталізації фізичної освіти та її категорійно-поняттєвий апарат, представлено засадничі позиції сучасних вітчизняних і зарубіжних підходів, спрямованих на досягнення високого рівня володіння поняттєвим апаратом фізики та вироблення психолого-педагогічних основ організації професійної підготовки майбутніх фахівців-фізиків, виокремлено компоненти підготовки майбутнього фахівця в умовах фундаменталізації професійної освіти.

Мета. Актуалізація необхідності фундаменталізації вищої освіти як основного критерію розвитку природознавчої компетенції майбутнього фахівця з фізики – вчителя і дослідника.

Виклад основного матеріалу. У контексті викликів, які сучасний ринок праці ставить перед фахівцями всіх рівнів підготовки, найважливішим напрямом розвитку є освіта. Від її ефективності залежить формування інтелектуального капіталу нації як одного з основних факторів розроблення й впровадження інновацій, що, своєю чергою, створює базові умови для швидкого оновлення технологій. У сучасних умовах фундаменталізація освіти є одним із найбільш значущих чинників підвищення її якості.

Компетентісно орієнтована освіта як складна, багатодисциплінарна проблема характеризується у науковій літературі переважно через призму ключових концепцій та механізмів, що реалізуються в психолого-педагогічній теорії та практиці освіти. Незважаючи на це, не існує надійних розвідок щодо її використання у навчанні майбутніх фахівців для науково-дослідної діяльності. Сучасні умови вимагають не вузькопрофільної моделі підготовки випускника університету, орієнтованої на певні предмети та інструменти праці, а моделі інтегрованого типу, де мета, зміст та результати навчання формулюються комплексно, з урахуванням змін у майбутній професійній діяльності, спрямованої на здобуття випускником широкої соціально-професійної компетенції.

Аналіз матеріалу дає підстави запропонувати модель підсистеми формування науково-дослідної компетентності майбутніх фахівців із фізики як складової формування готовності дослідників фізики до професійної діяльності. Найважливішу роль у формуванні цієї компетентності у фізиків-дослідників відіграє курс «Науково-дослідна діяльність із фізики». Наукова робота є невід'ємним компонентом навчальної діяльності закладу вищої освіти. Водночас процес глобалізації наукової та освітньої сфери вимагає необхідності вироблення творчих підходів до наукових досліджень, обміну новими результатами, викладання студентам магистратури основ наукових досліджень тощо.

Висновки. Проведене в окресленому напрямі дослідження дозволяє стверджувати, що ґрунтовна фундаментальна підготовка в галузі фізики й інформатики розвиває мислення майбутнього фахівця, формує стійку ціннісну орієнтацію на творчу самореалізацію та саморозвиток, допомагає випускникам університету, які обрали професію фізика-дослідника, швидше ставати майстрами своєї справи, а це є основним мірилом якості сучасного вчителя нової української школи.

Ключові слова: вища освіта, фундаменталізація освіти, інформаційні технології, науково-дослідницька компетентність.

ФУНДАМЕНТАЛИЗАЦИЯ ВЫСШЕГО ОБРАЗОВАНИЯ КАК ОСНОВНОЙ КРИТЕРИЙ ТРАНСФОРМАЦИИ К НОВОЙ УКРАИНСКОЙ ШКОЛЕ

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В статье охарактеризована базовая педагогическая концепция фундаментализации физического образования и ее категориально-понятийный аппарат, представлены основные позиции современных отечественных и зарубежных подходов, направленные на достижение высокого уровня владения понятийным аппаратом физики и выработку психолого-педагогических основ организации профессиональной подготовки будущих специалистов-физиков, выделены компоненты подготовки будущего специалиста в условиях фундаментализации профессионального образования.

Ключевые слова: высшее образование, фундаментализация образования, информационные технологии, научно-исследовательская компетентность.

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МЕТОДОЛОГІЧНІ ПІДХОДИ ДО ФОРМУВАННЯ ГОТОВНОСТІ МАГІСТРІВ ДО ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ОСВІТНЬОГО ПРОЦЕСУ В ЗАКЛАДАХ ДОШКІЛЬНОЇ ОСВІТИ

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У статті представлено тлумачення поняття «методологічний підхід». Виокремлено основні методологічні підходи до формування готовності магістрів до забезпечення якості освітнього процесу в закладі дошкільної освіти. Подано сутнісну характеристику системного, аксіологічного, акмеологічного, компетентнісного, синергетичного, особистісного, діяльнісного, технологічного підходів до реалізації системи підготовки майбутніх магістрів до забезпечення якості освітнього процесу в закладі дошкільної освіти. Висвітлено основні властивості означеної системи. Представлено провідну ідею концепції дослідження.

Ключові слова: методологічний підхід, система підготовки магістрів, властивості системи підготовки магістрів, методологічні підходи до формування готовності магістрів до забезпечення якості освітнього процесу в закладі дошкільної освіти, концепція дослідження.

Постановка проблеми. Забезпечення якості освітнього процесу, який уможливорює якісне формування професійної готовності чи компетентності фахівця, наразі є актуальною проблемою у світовому й українському освітньому просторі. Підготовка фахівців до забезпечення споживачів освітніх послуг якісною освітою здійснюється в загальній системі професійної освіти. Функціонування її ґрунтується на низці методологічних підходів. Існує чимало досліджень, присвячених методологічним засадам підготовки фахівців для освітньої галузі, проте проблема розроблення методологічних підходів до формування готовності магістрів до забезпечення якості освітнього процесу в закладі дошкільної освіти (ГДЗЯОП у ЗДО) не знайшла свого гідного вирішення в українській науці.