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EDUCATIONAL TECHNOLOGY INFORMATION SUPPORT

Annotation. *The paper shows that the educational process in a university is a purposeful sequence of pedagogical operations which is determined, directed and ensured by the accompanying informational support of educational tasks. Information technologies of stationary, correspondence and distance learning are the basis for building the structure and content of both specific academic disciplines and individual specialties. The literature analysis on the issues of philosophy and theory of education in universities has shown that improving the quality of education and the development of its new forms is a steady trend of recent times. To some extent, this is confirmed by the emergence of appropriate structures at the local (departments for ensuring the quality of education at universities) and state (the National Agency for Quality Assurance in Higher Education) levels. We have witnessed the Bologna education system with its corresponding pros and cons. We are currently facing a new challenge associated with a paradigm shift in education. The essence of the new education paradigm is to replace the knowledge-based approach with the so-called competency-based approach. The paper proposes a new "technological" approach to the strategy and tactics of the higher education pedagogical system development (within the framework of the well-known trend of "sustainable development"), in accordance with which such new concepts as the pedagogical system, pedagogical operations and their components are introduced, which together predetermines the methodology for constructing curriculum programs and teaching technology. It is shown that the curriculum of the academic discipline (course) is complex hierarchical systems, the elements of which are at different levels of subordination (in accordance with the goal tree) and depend on the individual initial training of students. Moreover, the methodology for constructing a hierarchical academic discipline also determines the method of its assessment in quality control of both the academic discipline (course) and the specialized educational department in which this discipline (course) is created. The features of recently adopted student-centered (student-oriented) education technology are reflected, in accordance with which the share of selective disciplines (courses) is increased, and traditional academic programs of disciplines (courses) – curricula – take the form of the so-called syllabus. The interrelation of the research and educational activities of the teacher is shown, which should be reflected in the developed curriculum of the course. It is proposed to evaluate the quality of this curriculum and the activities of the corresponding profile department according to the criteria of consistency, problematicity and activity of the course.*

Keywords*: philosophy of education; teaching and learning technology; information support; student-centered approach*

Introduction

Today e-learning has emerged as essential feature of the modern university teaching and is considered to be a specific-relevant performance criterion for universities. The relevance of the paper topic can be confirmed by the words spoken at the time by prof. L. P. Kapitsa, to wit: “the education of human creativity – is a fundamental task on which the future of our civilization may depend on a global scale, a task no less important than the problem of peace and the prevention of atomic war.” This is one side of the educational problem; the other side is the so-called interactive computer aided learning based on *information and communication technologies* in university curricula, student team learning, distance learning, etc.

One of the organization types is well known an educational institution which is a place where people of different ages gain an education, including preschools, childcare, primary-elementary schools, secondary-high schools, and universities. They provide a large variety of learning environments and learning spaces. It is natural to expect that educational policy in these developed countries is part of the economic policy that these countries have been pursuing for a long historical period of their development.

The Bologna Process is a series of ministerial meetings and agreements between European countries to ensure comparability in the standards and quality of higher-education qualifications. The process has created the European Higher Education Area under the Lisbon Recognition Convention. It is named after the University of Bologna, where the Bologna declaration was signed by education ministers from 29 European countries in 1999. The process was opened to other countries in the European Cultural Convention of the Council of Europe, and governmental meetings have been held in Prague (2001), Berlin (2003), Bergen (2005), London (2007), Leuven (2009), Budapest-Vienna (2010), Bucharest (2012), Yerevan (2015) and Paris (2018).

We have witnessed the Bologna education system with its respective pros and cons. At the mo-

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ment, we are facing a new challenge associated with a paradigm shift in education. The essence of the new paradigm is to replace the knowledge-based approach with a competency-based approach. In addition, relationships in the teacher-student system are changing now. According to the glossary approved by the decision of the National Agency for Quality Assurance in Higher Education of Ukraine of 29.08.2019 the student-centered approach considers the university entrant as a subject with their own unique interests, needs and experience, able to be an independent and responsible participant in the educational process. The opposite of this approach is the paradigm of the student as an object of learning, not capable of full-fledged activity, and therefore needs education and care. In this paradigm, the higher education institution (HEI) paternalistically decides what and how students should learn. The student-centered approach assumes mutual respect between the student and the teacher, real selectivity of disciplines, participation of students in the system of internal quality assurance and accreditation of educational programs, availability of procedures of response to complaints of students, etc. The teacher role as a facilitator (intermediary) is increased. He not only gives lectures, but also organizes interactive communication, promotes personal development of students, forms an atmosphere of mutual understanding and trust.

1. Review on General Teaching Philosophy

Historically, the need for education was secondary and followed the needs of society and the individual in that society. For example, during the formation and development of the Soviet Union in the 20s and 30s of the 20th century, there was a need to build a plant (for the production of military equipment or consumer goods). Call it the first conditional plant.

But the plant is not only a building, but also equipment. For the manufacture of equipment for the mentioned first plant, it was necessary to build a machine-tool plant (the second conditional plant). In turn, for the production of machines at the machine-tool plant there is a need for metal. For the production of the metal there is another need to build a blast furnace to smelt ore for the production of the metal (the third plant) as well as the need for mines for the extraction of the ore (the fourth plant) and coal (the fifth plant).

Further, all the five plants listed above need electricity and, therefore, a power plant (the sixth plant) must be built. Finally, all of these plants need *trained engineers and professional workers*. In this regard, there is a need to open educational institutions in the form of primary, secondary and higher education. Thus, the requirements for the education system stem from the needs of society and the individual in this society.

Today there are many new education trends [1-4]. In the theory of education the model of the hierarchy of needs of Marlow is known. Maslow's hierarchy of needs, represented as a pyramid with the more basic needs at the bottom (Fig. 1).

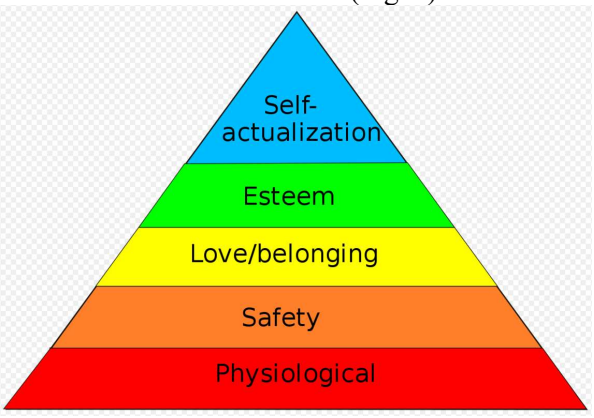

Fig. 1. Maslow's hierarchy of needs pyramid

Physiological needs include: homeostasis, health, food, water, sleep, clothes, shelter, and sex. *Safety and Security needs* include: personal security, emotional security, financial security, health and well-being, safety needs against accidents/illness and their adverse impacts. *Social Belonging* needs include: friendships, intimacy, and family. *Self-esteem* presents the typical human desire to be accepted and valued by others. People often engage in a profession or hobby to gain recognition. These activities give the person a sense of contribution or value. *Self-actualization* can include: mate acquisition, parenting, utilizing & developing, abilities, utilizing & developing talents, pursuing goals.

Learning Theory describes how students absorb, process, and retain their knowledge during learning. Cognitive, emotional, and environmental influences, as well as prior experience, all play a part in how understanding, or a world view, is acquired or changed and knowledge and skills retained.

Behaviorists look at learning as an aspect of conditioning and advocate a system of rewards and targets in education. Educators who embrace *cognitive theory* believe that the definition of learning as a change in behavior is too narrow, and study the learner rather than their environment including the complexities of human memory. Those who advocate *constructivism* believe that a learner's ability to learn relies largely on what they already know and

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understand, and the acquisition of knowledge should be an individually tailored process of construction.

Transformative learning theory focuses on the often-necessary change required in a learner's preconceptions and world view. Geographical learning theory focuses on the ways that contexts and environments shape the learning process.

Outside the realm of *educational psychology*, techniques to directly observe the functioning of the brain during the learning process, such as event-related potential and functional magnetic resonance imaging, are used in educational neuroscience.

The theory of multiple intelligences, where learning is seen as the interaction between dozens of different functional areas in the brain each with their own individual strengths and weaknesses in any particular human learner, has also been proposed but empirical research has found the theory to be unsupported by evidence.

Educational assessment or educational evaluation is the systematic process of documenting and using empirical data on the knowledge, skill, attitudes, and beliefs to refine programs and improve student learning. Assessment data can be obtained from directly examining student work to assess the achievement of learning outcomes or can be based on data from which one can make inferences about learning. Assessment is often used interchangeably with test, but not limited to tests. Assessment can focus on the individual learner, the learning community (class, workshop, or other organized group of learners), a course, an academic program, the institution, or the educational system as a whole (also known as granularity). The word "assessment" came into use in an educational context after the Second World War.

As a continuous process, assessment establishes measurable and clear student learning outcomes for learning, provisioning a sufficient amount of learning opportunities to achieve these outcomes, implementing a systematic way of gathering, analyzing and interpreting evidence to determine how well student learning matches expectations, and using the collected information to inform improvement in student learning. The final purpose of assessment practices in education depends on the theoretical framework of the practitioners and researchers, their assumptions and beliefs about the nature of human mind, the origin of knowledge, and the process of learning.

Learning by teaching **(**in the field of pedagogy) is a method of teaching in which students are made to learn material and prepare lessons *to teach it to the other students*. There is a strong emphasis on acquisition of life skills along with the subject matter. This method was originally defined by Jean-Pol Martin in the 1980s. Learning by teaching is connected with the so-called 'monitorial system', 'madras system', or lancasterian system which was an education method that took hold during the early 19th century, because of Spanish, French, and English colonial education that was imposed into the areas of expansion. This method was also known as "mutual instruction" or the "Bell-Lancaster method" after the British educators Andrew Bell and Joseph Lancaster who both independently developed it. The basic teaching and learning process used in the Monitorial System has been used in passing knowledge between people in many cultures because of its low cost to benefit ratio. Numerous institutions use the basic concept as their primary mode of instruction.

Educational technology is the use of physical hardware, software, and educational theoretic means to facilitate learning and improving performance by creating, using, and managing appropriate technological processes and resources. There are several discrete aspects to describing the intellectual and technical development of educational technology, to wit: theory and practice of educational approaches to learning; technological tools and media, for instance massive online courses, that assist in the communication of knowledge, and its development and exchange (this is usually what people are referring to when they use the term "EdTech"); learning management systems, such as tools for student and curriculum management, and education management information systems; back-office management, such as training management systems for logistics and budget management, and Learning Record Store for learning data storage and analysis; an educational subject in which relevant courses may be called "Computer Studies" or "Information and Communications Technology" also known as ICT.

So, the concept of *pedagogical technology* has firmly entered the pedagogical vocabulary.

However, in his understanding and use, there are big differences; however, most professionals support the following four fundamentals:

(1) planning of training and education on the basis of precisely defined desired standard;

(2) programming of the educational process in the form of a strict sequence of actions of the teacher and student;

(3) comparison of the results of training and education with the originally outlined standard both during the educational process (monitoring) and in summing up the results (learning outcomes);

(4) correction of results at any stage of the educational process.

The last but not the least aspect is that of science influence on both the society and education. Science, technology, society and environment education, originates from the science technology and society movement in science education. This is an outlook on science education that emphasizes the teaching of scientific and technological developments in their cultural, economic, social and political contexts. In this view of science education, students are encouraged to engage in issues pertaining to the impact of science on everyday life and make responsible decisions about how to address such issues. This meant that students would engage with different viewpoints on issues concerning the impact of science and technology on everyday life. They would also understand the relevance of scientific discoveries, rather than just concentrate on learning scientific facts and theories that seemed distant from their realities.

These and other issues of the interaction of science and education are discussed in detail in the references [5-16]. An analysis of these works shows that when developing working curricula for most technical disciplines, it is necessary to correctly build a hierarchical system of related disciplines based on engineering physics [17]. For example, when developing the working curriculum on mechanical engineering technology, it is necessary to take into account the results of a scientific study of thermal phenomena during grinding [18-21].

So, there is some analogy between the technological processes in industry and education. Consequently, the technological process in education (pedagogical process) can be represented by a hierarchical sequence of relevant technological operations, which, in turn, can be divided into smaller steps (educational transitions and working actions). The object of processing is the professional worldview of students who need to be trained.

2. Technological Approach to Engineering Curriculum Design

2.1. Learning Outcomes

The following considerations and beliefs were developed in conjunction with prof. L.I. Volchkevich who was a known leading expert in pedagogy. Firstly, education is not aimed at training personnel, but personalities – the country's future elite. Secondly, training should not focus on group, but on individual teaching methods. Currently, it looks like an "individual approach to students in a collective learning environment". Thirdly, the final learning outcomes are only (and first of all) expressed in the categories of knowledge, being able to create and/or implement, and skill (Fig. 2).

Knowledge is the generalized experience of people in the form of facts, rules, conclusions, patterns, ideas, theories that science owns.

Being able to create / implement (hereinafter "being able to") is the ability to perform certain actions on the basis of acquired knowledge.

Skill (habit) is the being able to create and/or implement which is brought to automatism.

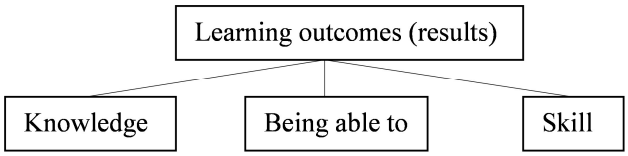

Fig.2. Learning outcomes (results)

2.2. System Representation and Assessment of the Course

The main accounting unit of the educational process is an *academic discipline* (academic subject, course, etc., hereinafter the course).

Each discipline should be considered as a knowledge system, i.e. as a coherent whole, composed of a number of components – sections and topics. An academic discipline (course) is a pedagogically substantiated information model of the relevant science. If the discipline is defined as a system, then the specialty's curriculum will be a subsystem, and sections (themes, modules) of the discipline will be subsystems. Any section or topic (a module in the credit-and-module-system) of the academic discipline should represent clearly defined subsystems, composed, in turn, from a number of interrelated notions and definitions.

The evaluation criterion is a systemic relationship between previous engineering (training) disciplines (courses) and special disciplines that are part of the specialty curriculum. A professionally prepared discipline can be compared with a strong polygonal pyramid, based on previous engineering disciplines (Fig. 3).

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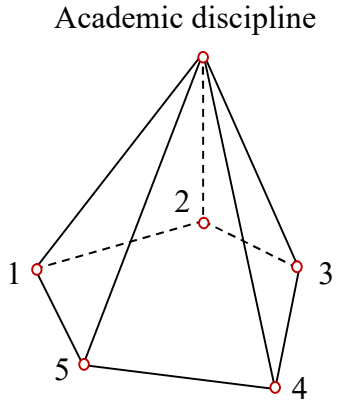

Fig. 3. Structure of connections of the current (provided) academic discipline with the previous (providing) engineering disciplines (1-5)

If the number of previous disciplines used in the course is 5-6, then the assessment (in terms of the system representation) should be "good". A similar pyramid (as Fig. 3) there should be a mutual relationship between general scientific and profiling departments of the university. This mutual relationship, as a sign of the system representation and learning sequence is mentioned in the work.

2.3. The Course Activity

A course in academic discipline should include following structural elements: systematics (general part); special knowledge (theories, ideas, laws, principles of this science); analysis as a "being able to" (or skill) (Fig. 2 and Fig. 3); synthesis as a skill (methods of calculation and design).

If the active part of the course (analysis, synthesis, methods of calculation and design) is at least 40 %, then the assessment (in terms of activity) should be "good" (according to prof. L.I. Volchkevich).

When choosing the type of education for a creative person preference should be given to problem learning (Fig. 4)

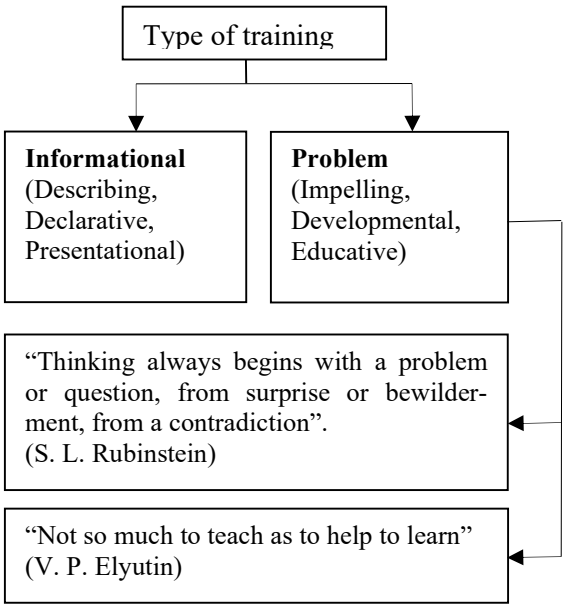

Fig. 4. Type and characteristic of training

The activity of the course to be taught can be confirmed by the presence of such methods of scientific research as analysis and synthesis (Fig. 5.).

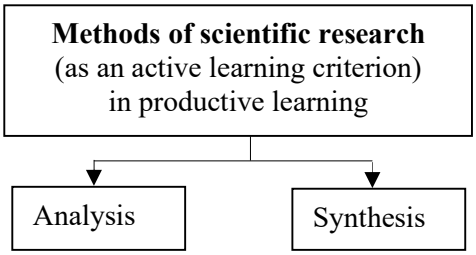

Fig. 5. Unity of educational and scientific activities in education

2.4. Student's Independent Work

The student's independent work is a form of training in which knowledge is acquired by the student himself under the methodological guidance of the teacher. In senior courses, this work should be aimed at creative disclosure of personality, which begins with the student bench. The university contains the following types of student activities: preparation for lectures, seminars, laboratory work and practical exercises, tests (module controls), exams. This work also includes writing essays, term papers and dissertations (projects). By the degree of creativity, the student's independent work is divided into

the following types: according to the model; reconstructive-variable; heuristic (partially search): creative research.

At the stage of student's independent work it makes sense to transfer the experience of the supervisor with graduate students to students. This requires the interest of both the student and the teacher in the systematization and acquisition of knowledge, which is possible if the student is involved in the sphere of scientific interests of his supervisor.

3. Student-Centered Education Paradigm

After the Ukrainian Revolution of Dignity in 2014, the radical reforming of the higher education sector has started aiming to establish an autonomous system aligned with the European higher education and research area, to develop quality assurance system at national and institutional levels, to ensure accountable and autonomous university management and governance, and to highly involve students and the other stakeholders into the decision-making process [22]. According to the Ukrainian National Agency for Higher Education Quality Assurance (NAQA) there were adopted regulations on Accreditation of Study Programs in Higher Education as well as the glossary containing a number of new provisions and terms. Now the content of the Educational Program aimed at the formation of competences defined by the higher education standard according to the corresponding specialty and degree level. For example, the *student-centered approach* considers the applicant for higher education as a subject with his own unique interests, needs and experience, able to be an independent and responsible participant in the educational process [22]. The opposite of this approach is the student paradigm as an object of learning that is incapable of full-fledged agency but, therefore, one that requires nurturing and nurturing. In this paradigm, higher education institutions paternally decide what and how students should learn.

The approach involves mutual respect between the student and the teacher, the real selectivity of the disciplines, the participation of students in the internal quality assurance system and the processes of accreditation of educational programs, the availability of procedures for responding to student complaints, etc. The role of the teacher as a facilitator is increasing. He not only lectures, but also organizes interactive communication, promotes personal development of students, creates an atmosphere of understanding and trust.

On the contrary, the delusional (fake, fictitious) educational process is a delusion of stakeholders and fraud. Its content is to create the visibility of the educational process in order to cover up its actual absence. This phenomenon occurs, for example, when the implementation of the educational process (conducting classes, control activities, etc.) is documented, but in reality it is not carried out: students and teachers are mostly not present at these classes, written tasks are not performed, grading occurs without a real evaluation of higher education applicants and the like.

The holistic approach is a kind of systematic approach to addressing specific issues. Thus, in the process of accreditation of educational programs it is important to take into account the complete picture of the organization of the educational process. Some drawbacks, miscalculations, lack of resources can sometimes be balanced by the right one strategy and related development prospects. On the other hand, obviously the strengths of an educational program, which only derive from the fulfillment of some of the criteria for evaluating the quality of educational programs, cannot be a justification for ignoring other criteria. In particularly, holistic education, a relatively new movement, began taking form as an identifiable area of study and practice in the mid-1980s in North America. It is a philosophy of education based on the premise that each person finds identity, meaning, and purpose in life through connections to the community, to the natural world, and to humanitarian values such as compassion and peace. Holistic education aims to call forth from people an intrinsic reverence for life and a passionate love of learning, gives attention to experiential learning, and places significance on “relationships and primary human values within the learning environment”. The term “holistic education” is often used to refer to the more democratic and humanistic types of alternative education.

Another a new principle is that of fitness for purpose [22] or the principle of adequacy, appropriateness, adequacy of the means used to achieve a specific goal, including conformity of teaching and teaching methods with the stated goals in the educational program. Higher education institutions should always have a rational explanation for their actions or policies.

Liberal arts education [22] is a concept designed to form the trajectory of one's own education through a higher education giver. It relies heavily on free choice courses. This approach is aimed at the

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personal growth of higher education applicants, including their intellectual capacity, decision-making ability, broad outlook, etc., as well as improving the quality of HEI educational process. It is related to the Western tradition of "liberal arts" education, in particular represented in the system of American liberal arts colleges, and related to HEI. This approach is fundamentally different from the training and involvement of higher education applicants in research. The Liberal arts education concept has a long history of development. It is from Latin words "liberalis" (i.e., "free") and "ars" (i.e., "art or principled practice"). This is the oldest program of higher education in Western history. It has its origin in the attempt to discover first principles – "those universal principles which are the condition of the possibility of the existence of anything and everything". The liberal arts, also known as the seven liberal arts, are those subjects or skills that in classical antiquity were considered essential for a free person (liberalis, "worthy of a free person") to know to take an active part in civic life, something that (for ancient Greece) included participating in public debate, defending oneself in court, serving on juries, and most importantly, military service. Grammar (1), logic (2), and rhetoric (3) were the core liberal arts (the trivium), while arithmetic (4), geometry (5), the theory of music (6), and astronomy (7) were the following stage of education (as the quadrivium). Liberal arts today can refer to academic subjects such as literature, philosophy, mathematics, and social and physical sciences; and liberal arts education can refer to overall studies in a liberal arts degree program. For both interpretations, the term generally refers to matters not relating to the professional, vocational, or technical curriculum. In connection with the issue under consideration, new terms "Minor" and "Soft skills" should be noted. Minor is a minimal set of courses that allows a higher education student to get a general picture of another industry or specialty. A specific minor is offered within a broad range of selected disciplines, in accordance with relevant HEI policy. For example, an undergraduate in any natural science field may choose a minor from political science, law, or translation – or vice versa. Soft skills or "success skills" allow graduates of the higher educational institution to be successful in their workplace. Soft skills include communication skills, leadership, the ability to take responsibility, work in critical conditions, ability to resolve conflicts, work in a team, manage their time, understand the importance of deadline (timely completion of tasks), the ability to think logically and critically, make decisions independently, creativity, etc. Occasionally, foreign language skills, especially English, are also included in social skills. The HEI should have its own policy regarding the development of soft skills in its higher education applicants and teachers. This policy also determines the cooperation with employers and graduates and influences the reputation of HEI. Sometimes the synonymous term is transferable skills. These are skills that are considered valuable in any workplace, regardless of professional field.

4. University Education Innovative Models

New innovations in higher education include standardization of curricula, an increase in the independence of universities and the share of academic disciplines offered for free choice. As an example of the standardization may be standard for specialty 131 – applied mechanics [23] or that for specialty 141 – electricity, electrical engineering and electromechanics.

The Verkhovna Rada of Ukraine approved the draft law "On Amendments to Certain Legislative Acts of Ukraine on Improving Higher Education Educational Activities". The law eliminates the notion of a "state diploma" and proposes higher education institutions to issue higher education documents on a model approved by their own academic council [24]. Higher education students will only be able to award diplomas to educational programs accredited by the National Agency for Quality Assurance in Higher Education. The new law eliminates the concept of "diploma of the state standard" and invites universities to give their diplomas. Also, students will be held more accountable for their academic integrity. In particular, the detection of plagiarism, fabrication or falsification in student works can become the basis for the cancellation of the decision to obtain a higher education degree. The explanatory note of this law indicates that "Adoption of the draft law will create conditions for strengthening the European foundations of the functioning of the higher education system, which will facilitate its rapprochement with other countries of the Bologna process – transparency, integrity, autonomy, responsibility for the result, identify and strengthen the principles of student-oriented education in institutions, educational services and management of higher education institutions, will create the preconditions for more equal access to education and better measurement of achievements through the expansion of the emergence of external independent evaluation, will improve the main instruments of state influence on the activities of educational institutions – licensing and accreditation" [25]. In this regard, the role and responsibility of HEI in ensuring the quality of high-

er education is increased, since the rating of the diploma will depend on the rating of the relevant HEI.

The development of the technological approach to higher education, considered in this paper, will contribute to the rating increase. This, in turn, increases the requirements for the scientific work of universities, since the quality of such work has become worse in recent years. University science suffers from diseases such as sophistry, eclecticism, profanation, plagiarism, nepotism, harmful influence of official position, etc. Old and worn out laboratory equipment of universities lead to invalid scientific results. As a result, the quality of the educational process at the university is deteriorating. There is a generalization (and simplification) of academic disciplines with a tendency to emasculate their essence. To some extent, these shortcomings are compensated by the fact that "the status of the research university has been strengthened and requirements for its granting have been also reinforced [25].

The domestic pedagogical school has good traditions, they should be maintained and developed [26-28] within the framework of such modern economic development trends as "Industry 4.0" and "Sustainable development".

Conclusions

1. Analysis of the literature on philosophy and theory of education in universities showed that improving the quality of education and the development of its new forms is a stable trend of recent times in e-learning, distance learning, student team learning, etc. To some extent, this is confirmed by the emergence of appropriate structures at the local (department of quality assurance at universities) and state (the National Agency for Quality Assurance in Higher Education) levels.

2. A new "technological" approach to the strategy and tactics of the development of the higher education system (within the framework of the trend of "sustainable development") is proposed, according to which such new concepts as the pedagogical system, pedagogical operations and their components are introduced, which together predetermines the methodology of building programs of academic disciplines and teaching technology.

3. It is shown that the curriculum of an academic discipline is complex hierarchical system with elements which are at different levels of subordination (in accordance with the tree of goals) and depend on the individual initial training of students. Moreover, the method of constructing a hierarchical discipline predetermines the method of its evaluation in quality control, both the discipline and the profiling department where this discipline was created.

4. A feature of recently adopted student-centered teaching technology, according to which the share of selective academic disciplines has increased due to a decrease in the share of traditional high-tech academic disciplines, is that the curriculum takes the form of the so-called syllabus.

5. The interrelation of research and educational activity of the teacher which is reflected in the developed curriculum of the course is shown. The quality of the curriculum is assessed according to the criteria of consistency, problematicity and activity of the course.

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ІНФОРМАЦІЙНА ПІДТРИМКА ТЕХНОЛОГІЇ ОСВІТИ

Анотація. *Показано, що навчальний процес у ВНЗ являє собою доцільну послідовність педагогічних операцій, яка обумовлюється, спрямовується і підтримується супутнім інформаційним забезпеченням навчальних завдань. Інформаційні технології стаціонарного, заочного та дистанційного навчання лежать в основі побудови структури та змісту, як конкретних навчальних дисциплін, так і окремих спеціальностей. Проведений аналіз літератури з питань філософії та теорії навчання у ВНЗ показав, що підвищення якості освіти та розвиток його нових форм є стійкою тенденцією останнього часу. Якоюсь мірою це підтверджується появою відповідних структур на місцевому (відділи забезпечення якості освіти при університетах) та державному (національне агентство із забезпечення якості вищої освіти) рівнях. Ми стали свідками Болонської системи освіти з її відповідними плюсами і мінусами. У цей час ми стикаємося з новим викликом, пов'язаним зі зміною парадигми освіти. Суть нової парадигми освіти полягає в заміні підходу, заснованого на знаннях, так званим компетентнісним підходом. У статті запропоновано новий «технологічний» підхід до стратегії і тактики розвитку педагогічної системи вищої освіти (в рамках відомої тенденції «сталого розвитку»), згідно з яким введено такі нові поняття як педагогічна система, педагогічні операції та їх складові частини, що разом зумовлює методику побудови програм навчальних дисциплін і технологію викладання. Показано, що робоча навчальна програма академічної дисципліни є складною ієрархічною системою, елементи якої знаходяться на різних рівнях співпідпорядкованості (згідно з деревом цілей) і залежать від індивідуальної вихідної підготовки учнів. Причому, методика побудови ієрархічної навчальної дисципліни (курсу) зумовлює і спосіб її оцінки при контролі якості, як навчальної дисципліни (курсу), так і профілюючої кафедри, на якій ця дисципліна створена. Висвітлено особливості прийнятої останнім часом студенто-центрованої (студенто-орієнтованої) технології освіти, відповідно до якої збільшена частка виборних навчальних дисциплін, а традиційні програми навчальних дисциплін приймають форму так званого силабуса. Показано взаємозв'язок науково-дослідної та навчально-просвітньої діяльності викладача, який має бути відображений у розробленій навчальній програмі курсу. Якість цієї програми та діяльність відповідної профілюючої кафедри запропоновано оцінювати за критеріями системності, проблемності та активності курсу.*

Ключові слова*: філософія освіти; технологія викладання та навчання; педагогічна система; студенто-центрований підхід, інформаційна підтримка*

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ИНФОРМАЦИОННАЯ ПОДДЕРЖКА ТЕХНОЛОГИИ ОБРАЗОВАНИЯ

Аннотация. *Показано, что учебный процесс в вузе представляет собой целесообразную последовательность педагогических операций, которая обуславливается, направляется и поддерживается сопутствующим информационным обеспечением учебных задач. Информационные технологии стационарного, заочного и дистанционного обучения лежат в основе построения структуры и содержания, как конкретных учебных дисциплин, так и отдельных специальностей. Проведенный анализ литературы по вопросам философии и теории обучения в вузах показал, что повышение качества образования и развитие его новых форм является устойчивой тенденцией последнего времени. В какой-то мере это подтверждается появлением соответствующих структур на местном (отделы обеспечения качества образования при университетах) и государственном (национальное агентство по обеспечению качества высшего образования) уровнях. Мы стали свидетелями Болонской системы образования с ее соответствующими плюсами и минусами. В настоящее время мы сталкиваемся с новым вызовом, связанным с изменением парадигмы образования. Суть новой парадигмы образования заключается в замене подхода, основанного на знаниях, так называемым компетентностным подходом. В статье предложен новый «технологический» подход к стратегии и тактике развития педагогической системы высшего образования (в рамках известной тенденции «устойчивого развития»), в соответствии с которым введены такие новые понятия как педагогическая система, педагогические операции и их составные части, что вместе предопределяет методику построения программ учебных дисциплин и технологию преподавания. Показано, что учебная программа академической дисциплины является сложной иерархической системой, элементы которой находятся на разных уровнях соподчиненности (в соответствии с деревом целей) и зависят от индивидуальной исходной подготовки учащихся. Причем, методика построения иерархической учебной дисциплины предопределяет и способ её оценки при контроле качества, как учебной дисциплины, так и профили-*

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рующей кафедры, на которой эта дисциплина создана. Отражены особенности принятой в последнее время студенто-центрированной (студенто-ориентированной) технологии образования, в соответствии с которой увеличена доля выборных учебных дисциплин, а традиционные программы учебных дисциплин принимают форму так называемого силлабуса. Показана взаимосвязь научно-исследовательской и учебно-просветительной деятельности преподавателя, которая должна быть отражена в разработанной учебной программе курса. Качество этой программы и деятельность соответствующей профилирующей кафедры предложено оценивать по критериям системности, проблемности и активности курса.

Ключевые слова: *философия образования; технология преподавания и обучения; педагогическая система; студенто-центрированный поход; информационная поддержка*

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