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A COMPETENT APPROACH TO TEACHING MANAGEMENT DISCIPLINES IN THE CONDITIONS OF THE FORMATION OF "INDUSTRY 5.0"

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INTRODUCTION

In the modern world, the requirements for a specialist are defined in the format of competencies, or requirements for him or her to be competent. Translated from Latin, *"competentia"* means a range of issues in which an individual is well-informed, has learned them and has experience. Therefore, *competence* is awareness, knowledge and authority, and *capacity* is the affiliation, proficience and experience of an individual that he or she can use in practical activities. Competencies are formed in the process of learning, under the influence of family, friends, work, politics, religion, culture, etc. and are the result of acquiring capacities.

The term *"capacity"* in scientific usage is a general social norm, a model; formulated and defined rules; a set of knowledge, abilities and skills. The key words of the interpretation of this term are the following: "separated from the subject, a predetermined social requirement (norm)", "a sum of knowledge, skills and characteristic features", "requirements for the assimilation of a set of knowledge, methods of activity, experience by individuals", "knowledge, skills, abilities and other attributes of a person necessary to perform a certain activity".

In the general provisions of the Law of Ukraine "On Education", *competence* is defined as "a dynamic combination of knowledge, abilities, skills, ways of thinking, views, values, and other personal qualities that determine a person's ability to successfully socialize, perform professional and/or further educational activities"[1]. The concept of competence covers not only cognitive and operational-technological components, but also motivational, ethical, social and behavioral. It contains learning outcomes (knowledge and skills) and a system of value orientations.

1. Prerequisites for teaching management disciplines based on a competent approach

Education as a process and result of knowledge and awareness, the formation of the ability to solve emerging problems, values-based

[1] Про освіту : Закон України від 5.09.2017 р. № 2145-VIII. URL: http://zakon3.rada.gov.ua/laws/show/2145-19.

attitude to the surrounding world, the readiness to implement the acquired knowledge in various situations is based on a competence approach, the implementation of which depends on the general educational and cultural situation in which a person lives and develops[2].

A competent approach enables higher professional education to move from an orientation on the reproduction of knowledge to the use and organization of knowledge, orienting human activity to the endless variety of professional and life situations of an individual. Therefore, it is characterized by systematicity and interdisciplinarity, personal and activity aspects, and has a practical, pragmatic and humanistic focus.

A set of qualitative shifts, among which the transition from assimilation of information to the formation of qualities necessary for creative activity and constant assimilation of new information acquires the characteristics of a revolution in education, the main orientation of which is the formation of a creative personality capable of self-development. On this basis, the term "competent education" emerged in the USA.

Complex generalized methods of activity mastered by a person during training and competence as a result of the acquisition of capacities were actualized in the concept of "educational capacities", in the complex of which an additional possibility of a systematic representation of educational standards is laid for the construction of clear meters for checking the success of their mastery by persons studying.

Educational capacity is a requirement for educational training, outlined by a set of interconnected substantial orientations, knowledge, abilities, skills and experience of a student's activity in relation to reality, problems and prospects in the relevant functional area, necessary for the implementation of personally and socially significant productive activities.

Key educational capacities are specified in educational subjects as "ability to act" and are taken into account when preparing programs, manuals and textbooks. According to this, the integrative concept of "capacity" includes the following aspects: readiness for goal setting; readiness for assessment; readiness for action; readiness for reflection (introspection).

Key capacities are a new paradigm of educational outcome. The documents and materials of UNESCO outline a range of capacities that should be considered by everyone as the desired result of education. In the report to the international commission on education for the 21st century. "Education: The Hidden Treasure" Jacques Delors formulated the "four pillars" on which education is based: "learning to know, learning to do, learning to live together, learning to live", and essentially defined the main *global competencies*. Thus,

[2] Компетентнісний підхід у сучасній освіті: світовий досвід та українські перспективи: Бібліотека з освітньої політики / Під заг. ред. О. В. Овчарук. Київ : К.І.С., 2004. С. 20.

according to Jacques Delors, one of them declares – to learn to do, in order to acquire not only a professional qualification, but also, in a broader sense, competence, which makes it possible to cope with various and numerous situations and work in a group. In the conceptual field, competence becomes closer to the concept of "know how" than to the concept of "know that".

In view of this, the education system must meet the modern social order, which requires the education of independent, proactive and responsible members of society, able to effectively interact in the performance of socio-economic, technological and environmental tasks. Completing these tasks requires strengthening the independent and productive activity of students, the development of their personal qualities and creative abilities, the ability to independently acquire new knowledge and solve problems, navigating social life.

There is no single, agreed list of key competencies, since competencies are primarily an order of society (business) to train its citizens (specialists). Basically, it is determined by the coordination of the positions of society in the country or region, but it is not always possible to achieve it. At the symposium of the Council of Europe on the topic "Key capacities for Europe", approximately the following list of key capacities was defined[3].

Learn: learn to benefit from experience, organize interconnections of your knowledge and arrange them, organize your own learning methods; to study independently.

Search: use different databases; survey the environment, consult an expert; receive information; to be able to work with documents and classify them.

Think: to trace the relationship between past and present events; to be critical of one or another aspect of society's development; learn to overcome uncertainty and difficulties; to express and defend one's point of view; understand the importance of the political and economic conditions in which study and work are carried out; evaluate social habits related to health, consumption, and the environment; evaluate works of art and literature.

Cooperate: strive for cooperation and learn to work in a group; make decisions – settle disagreements and conflicts; be able to negotiate; be able to develop and execute contracts.

Join activity: get involved in the project; bear responsibility; join a group or team and contribute; prove solidarity; be able to organize one's work; be able to use measuring and modeling devices.

Adapt: use new information and communication technologies; demonstrate flexibility in conditions of rapid changes; prove resilience in the face of difficulties; be able to find new solutions.

[3] Россоха В. В. Методика викладання маркетингу на засадах компетентнісного підходу. *Сучасна соціально-економічна система: парадигма, завдання і тенденції у 2-х частинах*: зб. наук. пр. Ніжин, 2018. Ч.2. С. 173–176.

To acquire professional competencies in management based on educational capacities, a method of teaching management disciplines has been developed, which includes preparation of materials, presentations and work in groups (table 1).

A competent approach in the design of educational activities, the result of which is the acquisition of capacities, allows simulating student learning to prepare competent specialists.

Table 1

Acquisition of professional competences by students in the process of study

Learning outcomes		**Professional capacities**
I know that	1	Possession of the terminological apparatus of management, methodology and techniques of market research using available methods, laws, functions, principles, learning opportunities, methods of transfer and assimilation of the content of an educational discipline or educational material
I know how	2	The ability to use terms, concepts, categories in the process of educational and practical activities, to identify and refer to sources of information, to perform educational tasks based on the acquired knowledge
I know why	3	The ability of logical justification, argumentation, refutation, scientific proof, dialogical persuasion, systematization and classification of facts, phenomena and processes in the field of management activity
I know for what	4	The use of methods of educational and cognitive problems, managerial, probabilistic, statistical and other methods of cognition, modern means of information and information technologies, search, analysis, selection, processing, storage and transmission of relevant information and self-determination in relation to this knowledge, the ability to distinguish facts from speculations.

Source: author's study.

Therefore competence should include not only existing in-depth professional knowledge in the field of management, the ability to analyze and forecast the development of the situation, but also practical knowledge of solving and discussing problems. In order to increase the level of formation of professional competence, gain practical experience in management, use of acquired knowledge, the ability to effectively and timely solve problem situations, business simulations are introduced into the educational process that simulates the real economic space in a virtual environment.

To perform practical tasks, students implement the computer business game "Titans of International Business", which simulates the activities of a

separate business entity in the global market environment. To conduct a business game, participants are informed of the rules and calendar of games. Students form game teams, whose members determine the coordinator (captain). The captain is entrusted with the functions of organizer, coordinator, strategist, and public representative of the team. The captain distributes the functions of managing the main economic processes among the team members.

The scenario of the business game envisages the management of business processes at enterprises that carry out production and sales activities in the domestic and foreign markets. To determine the strengths of students (manager, administrator-analyst, entrepreneur-generator of ideas, integrator-people-centered), they conduct a test (the Adizes test), the results of which are of a recommendatory nature for the formation of teams for 10 enterprises. Teams involve credit resources, purchase technological equipment, raw materials, packaging materials, hire personnel, produce, advertise and sell industrial products, carry out current and capital repairs of production facilities.

Conducting practical classes in the form of training is aimed at the development of communication skills, understanding of business processes, formation of leadership qualities, project management skills and team work among students acting as training participants. The computer program determines the results of the team's activity and rating based on the indicators of profitability, financial stability and financial liquidity of enterprises.

Thanks to the training using the computer business game "Titans of International Business" (business tournament) and the online information platform, feedback between the teacher and the student is ensured; constant communication with the student audience. Each team makes its own decisions and reports on them to the teacher every week in practical classes.

The role of the head of the business entity is played by a student who is a user of the program. He or she learns to process informational materials of a virtual enterprise, make management decisions, analyze them, consolidates and acquires new practical skills and the ability to solve practical tasks and solve problem situations.

The business game gives participants the opportunity to experiment in different situations, to develop alternative strategies for solving complex production and economic problems using scientifically based and intuitive methods, in particular, the "trial and error" method, to carry out on their basis the verification of previously set goals and hypotheses.

The software product "Titans of International Business" is adapted for use by specialists in the field of management sciences, has a convenient interface and contains a large number of built-in tools, in particular budget and financial management, which make it possible to solve various tasks at

the strategic, tactical and operational-technical level. The main scientific principles are implemented in the program: simplicity and availability of information; multivariate management decisions.

To participate in the competition, the game teams receive a "Username" and "Password" to access the user menu. Teams receive initial documentation about the operation of the virtual enterprise for previous periods (each game period is a month of operation of the enterprise), a user manual and a calendar of games. The number of game periods is determined by the number of practical classes. In the event of unforeseen situations (late information input), the team is not disqualified and the computer makes "zero" decisions instead, which subsequently affects the business results.

The gaming industry is represented by enterprises of the chemical industry, the main activity of which is the production and sale of nitrogen fertilizers and semi-finished products. They have identical opportunities for the development of the enterprise and the formation of a sufficient level of export potential, necessary for competitive struggle in the regional markets of the world.

The high level of concentration of the game participants implies that during the development of one's own strategy one should take into account the possible "moves" (strategies) of other participants regarding the production of products (ammonium nitrate (AN), carbamide (CA), carbamide-ammonia mixture (CAM) and its sale on markets of the EU, North and South America, Asia and Ukraine at a price set per 1 ton of products, taking into account the costs of production and packaging of products (bulk, bags of 50 or 1000 kg).

Taking into account the specifics of enterprises, modules for the purchase and/or sale of equipment with different parameters of energy consumption and capacities are implemented; repair of various types of equipment; production of nitrogen fertilizers taking into account production technological schemes; sales of products on domestic and foreign markets; seasonality, taking into account the climatic conditions of the regions; sales of semi-finished products – ammonia; receiving loans and deposits; free and paid acquisition of analytical information.

At the beginning of the game, the teams are on equal terms and have the same indicators of financial and economic activity. They analyze the indicators of the initial (first) period, determine the strategy and tactics for the following periods and develop their own tasks, predicting in advance various consequences of the implementation of their own behavior in various markets (equipment, materials, information, products, etc.).

In general, the decision-making process follows the scheme: "management decisions → algorithm for distribution of product sales volumes → output of calculation results". The players enter the decisions made in the "Decision Making Form", which is the basis of the client module

(participant's menu on the website). After that, the data from the completed forms are automatically transferred to the administrative block, where all the necessary indicators are calculated and the results of the game are visualized.

Based on the results of the calculations, the teams receive detailed operating budgets (sales, production, production stocks, direct material costs, direct labor costs, general production costs, administrative costs, sales costs, etc.) and financial budgets, which are formed in the form of a report on financial results, cash flow statement (management form) and enterprise balance sheet. Financial reporting in the program is presented in accordance with the requirements of the Accounting Regulations (standard) in force in Ukraine.

During the game periods, players make management decisions in the following areas of the company's activities: purchase and/or sale of equipment; carrying out repair work of equipment; purchase of raw materials; production of products; packaging of finished products (management of product diversification); transportation and sale of finished products on domestic and international markets; sale of semi-finished products; conducting advertising events; obtaining and repayment of loans; opening and closing deposit accounts; acquisition of analytical information.

Management decision-making begins after the players have previously studied the history of the enterprise for the previous four periods (months), which were carried out by the computer without the participation of the players. Thus, at the beginning of the game, the enterprise has formed capital in the form of fixed assets, intangible assets and cash.

Starting from the fifth period, the tasks of the players consist in the formation of production capacities and the production of products, which should ensure the appropriate level of profitability of the enterprise. Further, new tasks related to the development of the enterprise, maintaining or expanding its market positions and consolidating the financial position will arise.

During practical classes, certification of students is provided, who systematically and timely report to the teacher on the results of completing individual tasks and solving situations that arose during the game, in accordance with the established schedule based on the materials of the enterprises. Monitoring of students' fulfillment of requirements for taking practical classes is carried out in two forms: current and final.

In the process of conducting a business game, students demonstrate their self-organization, interaction with each other, epistemic and social competent confidence, witness the transition from performing algorithmic (routine) tasks, the share of which is 30%, to heuristic (creative) tasks with the share of 70%, innovative thinking at solutions to problematic situations.

The relevance of studying various aspects of this phenomenon, determining the factors influencing this process, determined the need to substantiate the conceptual provisions of the manifestation of the competent

approach for the development of theoretical foundations and practical ways of forming key competencies of students in the learning process and professional capacities of future specialists in the field of management in the context of the formation and development of the fifth industrial revolution.

2. The influence of “Industry 5.0” on the educational process in teaching management disciplines

"Industry 5.0" is based on the concept of "Industry 4.0", which involves the digital transformation of business process management, automation and optimization to increase the efficiency and flexibility of production. The impulses for the development of “Industry 5.0” are events related to inventions, gradually and systematically leading to a systemic transformation with economic and production consequences of the transition, influencing society, the management system and human identity.

At the same time, they focus on the use of these technologies and the desire to return human, social and ecological aspects to production, which becomes possible when implementing the concept of "Society 5.0". Humans are expected to perform intellectual work that requires critical thinking and non-standard approaches, while machines are expected to safely assist humans in performing precise, complex and dangerous processes. Obviously, this requires qualified personnel and appropriate training.

Capacities and competences in education have become the subject of multidisciplinary discussion by many researchers. The essence of these defining categories of the competent approach to education is substantiated by M. Golovan, emphasizing that you can become competent by mastering certain competencies and implementing them in the practice of a specific activity. The author presents the internal structure of competence as a set of interconnected motivational, cognitive, activity-based, value-reflexive and emotional-volitional component[4].

V. Bakhrushyn argues for the definition of these concepts through the prism of new standards of higher education, establishes some inaccuracies in the legislation, emphasizes the need for terminological consistency, the violation of which can create legal uncertainty. Contradictions regarding the use of the terms competence and capacity can lead to legal conflicts, the author notes[5].

Yu. Poskrypko and O. Danchenko consider the process of development of capacities and the formation of competence in the form of a hierarchical

[4] Головань М. С. Компетенція і компетентність: досвід теорії, теорія досвіду. URL : https://core.ac.uk/download/pdf/324272272.pdf.

[5] Бахрушин В. Компетентності і результати навчання у нових стандартах вищої освіти. URL: http://education-ua.org/ru/articles/702-kompetentnosti-i-rezultati-navchannya-u-novikh-standartakh-vishchoji-osviti.

structure and the proposed "Pyramid of competence" based on the development of capacities[6].

The synergistic approach to education as a person-oriented process of creating a student's own learning trajectory aimed at ensuring high-quality self-training, self-education, and self-development is elaborated by A. Vagis[7]. The qualitative process of professional competence formation, the author claims, will ensure a focus on the needs of the student's educational activities, the development of a student-centered educational environment, interdisciplinary and transdisciplinary connections, and the implementation of methods and forms of learning of an interdisciplinary and transdisciplinary nature.

Consideration of professional competence from the standpoint of acmeology and overcoming the gap between the level of theoretical knowledge of students and the practical skills of their application in professional activity is carried out by B. Mokin et al.[8].

The importance of defining capacities and forming competences, developing professional competences, using educational technologies, developing knowledge and skills necessary for professional practice is emphasized in the scientific works of foreign authors[9].

However, the acceleration of the scientific and technological development of society actualizes the revision of approaches to the professional competences of education seekers. In the conditions of the formation of the fifth industrial revolution, capacity should be considered as expected

[6] Поскрипко Ю. А., Данченко О. Б. Компетенція і компетентність: консенсус. *Вчені записки Університету «КРОК»*. 2019. № 3(55). С. 117–127.

[7] Вагіс А. Формування фахової компетентності студента як синергетичний процес. *Ukrainian Journal of Educational Studies and Information Technology*. Vol. 5. No 2. June 2017, pp. 5–8.

[8] Мокін Б. І., Мізерний В. М., Мензул О. М. Формування професійної компетентності студентів в умовах професійно-практичної підготовки. *Вісник Вінницького політехнічного інституту*. 2011. № 5. С. 199–203.

[9] Westera W. Competences in education: A confusion of tongues. *Journal of Curriculum Studies.* 2001.Vol. 33. Issue 1, pp. 75–88. Moore D., Cheng M., Dainty A. (2002). Competence, competency and competencies: performance assessment in organisations. Work Study. Vol. 51. No 6, pp. 314–319. Belanich J., Moses F.L., Lall P. (2016). Review and Assessment of Personnel Competencies and Job Description Models and Methods.Institute for Defense Analyses. 33 p. Retrieved from : https://apps.dtic.mil/dtic/tr/fulltext/u2/1021552.pdf. Hagen S., van Deventer V., van Eeden R. (2018). Beyond competence: negotiating identity and agency in the professional development of student psychometrists. SOUTH AFRICAN JOURNAL OF PSYCHOLOGY. Doi: 10.1177/0081246320951687. Digital competence in high school teachers as a means for educational innovation. (2020). CPU-E REVISTA DE INVESTIGACION EDUCATIVA / L. Bustos et al. Vol. 26. ISSN 1870-5308.

and measurable achievements that confirm the ability (capacity) of a person to perform certain actions independently.

The general structure of capacity is determined by such components as knowledge and understanding; knowledge of how to act (practical and operative application of knowledge in a specific situation, certain experience); knowledge of how to procced (management of values in making any decisions, solving any situations).

The technological and economic changes caused by the progress of "Industry 5.0" are closely related to the integration of such innovations as artificial intelligence, blockchain, Internet of Things, cryptocurrencies, automation tools, etc. Optimizing the processes of integration of innovative achievements significantly affects the importance of a person in performing many tasks in various fields. At the same time, it aims to solve the problems of the transition of education from assessing the quality of training not as a set of integrated and specialized knowledge, abilities and skills of the acquirers, but as a set of integrated and specialized professional competencies. They demonstrate a person's ability to act in a difficult situation, to solve professional tasks with a high degree of uncertainty, to achieve high work results, to treat the profession as a value.

The impulses for the emergence of "Industry 5.0" mark the development of intelligent devices, intelligent systems and intelligent automation and predict the need for training to use the acquired knowledge, skills and abilities in the expected situation, to anticipate problems and find opportunities to eliminate them.

In the conditions of a changing reality, the application of new technologies, the professional and personal growth of the subjects of study opens up to broad scientific projections and the applied potential of professional training in accordance with the needs and requirements of the labor market, high-quality performance of work in the relevant professional circle. The innovative component in education becomes one of the main sources of its development.

The ability and readiness of university graduates to compete in the labor market increasingly depends on innovativeness as an integral feature of education, science and production. The urgency of the outlined problem is due to the need for Ukraine to enter the European educational space and the obligation to respond to new challenges of the time. The leading factor in the implementation of the competent approach in education is the formation of the specialist's professional capacity, which proves his readiness to effectively, independently and creatively solve professional tasks in various situations.

The fifth industrial revolution predicts the unification of human intelligence, the creative abilities of individuals with the capabilities of machines, and the synergy between humans and autonomous machines.

Such changes will lead to an exceptionally efficient production process with high added value, the prosperity of reliable autonomy, the reduction of waste and production-related costs. An autonomous workforce will become receptive and informed of human intent and desire. The volume of information that requires critical thinking and mediating it with thought will grow adequately, making this information knowledge.

In this way, information becomes the starting point, not the end point, for the development of the ability to independently analyze it and draw one's own conclusions. The scale of information determines the establishment of new principles and guidelines for a synergistic approach to education. Accordingly, the integration, retransmission, transformation and systematization of interdisciplinary knowledge ensures the creation of a person's own new knowledge product.

Such self-organization in the educational process is largely based on a person-oriented focus, building one's own learning trajectory and the ability to self-prepare, self-educate, and self-develop. It can be both an independent (creative) process of an education seeker and a guided advisor who organizes, directs, and defines learning goals.

The paradigm of the "fifth industry" is based on a number of emerging trends that are generating new trends. Among them are cybernetic systems; "smart" infrastructure; decentralized targeted production; long-term forecasts, planning and management of systems based on Big Data; data exchange, reaction and processing time; blockchain in all areas where accuracy, speed and security are required; digital doubles and virtual reality; alternative networks in augmented reality and IoT infrastructure; unification of cloud and peripheral computing; customization and high loyalty, revolution of marketing tools; models with flexible Agile and DevOps principles; modular structures instead of monolithic hierarchies.

An important aspect of competence is the ability of a person to express qualified judgments, make appropriate decisions to solve specific problems, plan and implement production tasks that ensure the rational and successful achievement of set goals.

The fulfillment by specialists of their functional duties includes two interrelated components of professional competence: the presence of a set of specialized knowledge acquired in the process of theoretical mastery of the profession, and certain professionally significant personal qualities acquired in practical activities.

The acquisition of theoretical knowledge in the learning process is based on the effective use of the potential capabilities of the future specialist and is built according to the logic of knowledge acquisition, and practical knowledge is based on external resources and is carried out according to the logic of the formation of skills and abilities. Abstract thinking and a

scientific approach to practical activities allow the student to independently check the level of competence achieved, the ability to choose and make decisions in real conditions.

"Industry 5.0" is characterized by the fusion of intelligent devices, intelligent systems and intelligent automation with the physical world in cooperation with human intelligence. The term "automation" describes autonomous robots as intelligent agents that work simultaneously with humans in the same workspace. Trust and reliability between these two assets enable forward-looking efficiency, flawless and flexible production with minimal waste.

Consequently, new demands are being made for the professional competences of the future executors of this process, for the methodology and methods of mastering it, for the scientific outlook and fundamental theoretical professional training. They are provided by the broad involvement of education seekers in scientific activities, cooperation with leading scientific institutions, in the implementation of scientific projects, as well as the formation of creative scientific teams to produce innovative and significant results and business ideas and launch startups. Research activities are provided with the highest form of individualization of learning, independent knowledge, development of creative thinking and scientific prediction, and the innovative component becomes an integral feature and the main source of development of education, science and production, the ability and readiness of the individual to compete in the labor market.

The concept of "Industry 5.0" is directly related to the concept of "Society 5.0", in which advanced information technologies, the Internet of Things, robots, artificial intelligence and augmented reality are actively used in everyday life, industry, health care and other spheres of activity, primarily not for economic benefit, but for the benefit and convenience of every citizen. "Society 5.0" involves changes in communications, the ability to distinguish between communicative situations in order to choose favorable forms of interaction, since environmentally adequate approaches to solving communicative problems ensure mutual understanding in the process of communication.

In view of the above, an understanding of social reality, an adaptive perception of oneself in time and space, building a life project for the future in a combination of individual and collective values becomes a universal requirement. Great importance is attached to subjective value orientations that determine socially acceptable norms of behavior, actions, effective interaction and parity of relations, taking into account self-worth and dignity.

The key trends of "Industry 5.0" include the balance of economic development with the solution of social and environmental problems, which is based on the rapid restoration of biological resources and the use of virtually inexhaustible sources of energy and high-end technologies.

Currently, research in this area theoretically substantiates *"sustainable development"* (the policy of development, coordinated with the state of Nature and its laws, the formation of local actions on its basis in the context of global interests and restrictions). In an applied sense, this Policy aims at assessing the natural resource potential and ecological state of the territory, developing environmental management strategies based on IT solutions and forming productive ecosystems based on the biotechnologies of the *"green"* and *"blue"* economy, or bioeconomy[10].

The bioeconomy concept focuses on a meta-level vision of the *"sustainability"* of societal transformation, the potential contribution of the bioeconomy to sustainability, the role of bioresources, innovation, governance and multi-stakeholder collaboration, the importance of life cycle tools to guide decision-making regarding renewable resources, transformation technologies and materials, as well as energy products. At the same time, the biotechnological value chain is used as a basis that comprehensively combines biophysical, social, technological and economic components.

At the same time, the Concept stipulates the acceleration of the transition to the bioeconomy through education, paying attention to various holistic and multidimensional methods of assessing sustainability, realizing the potential of such convergent technologies as digitalization for the biological transformation of the industrial sector, principles of systems thinking and approaches to inter– and transdisciplinarity in the bioeconomy sector, including industry.

An important area of providing competencies for education seekers is flexible orientation in changing social conditions and processes of effective interaction of the economy with the social environment, determining social and environmental priorities for technological innovations, and shifting the emphasis from individual technologies to a system of technologies. Currently, six signs of future technological structures have been established, each of which reveals its potential in combination with others. They include:

1) individualized human-machine interaction;
2) bioinformation technologies and intellectual materials;
3) digital duplicates and simulations;
4) data transmission, storage and analysis technologies;
5) artificial intelligence;
6) technologies of energy efficiency, renewable energy sources, storage and autonomy.

[10] Россоха В. В. Черемісіна С. Г. Концептуальні засади формування ключових компетентностей фахівців для "Індустрії 5.0". *Нові компетенції для Індустрії 5.0 та управління даними для закладів вищої освіти* : збірник матеріалів круглого столу. Київ : НаУКМА, 2023. С. 12–21.

Integration and active use of physical and virtual space is deepening at a rapid pace. Virtual reality is already used in the fields of architecture, design, medicine, automobile, aircraft and shipbuilding, in the modeling of power units, production stages, and in the processing of processes of interchangeability of parts. Methodically, this technology can be used wherever there is a need to work with three-dimensional data. The virtual reality system also includes training and science. Consequently, the development of this world, created by technical means in the form of the identity of the material and the ideal, becomes a requirement of the times.

In technologies that complement and not replace humans, all cybernetic systems must be networked, interact with humans in real time, and actively participate in the value chain. Therefore, "Industry 5.0" foresees a new production role of the employee, who should be endowed with such key competencies as:

– a deep understanding of the work of robots and their interaction with people;

– modeling of the human factor and human-machine interaction;

– work experience in the field of robotics, artificial intelligence;

– knowledge in the field of computing for managing production processes and protecting the environment, reducing pollution and waste generation;

– making decisions on whether to include or remove robots from the environment/production floor to achieve optimal productivity and efficiency.

The further development of artificial intelligence, neural networks, the Internet of Things, cloud technologies, high-speed 5G data transmission, telematics, peripheral and quantum computing will require knowledge of technologies to achieve a balance of IT with ecology, cyber security and human capital.

Therefore, the formation of key competencies of specialists in the field of management for “Industry 5.0” should be based on the development of human-centric technologies, strengthening of human physical capabilities, their creative and intellectual potential, high living standards, ecology, creativity, high quality of customized products, and from the standpoint of cognitive choice – soft skills.

CONCLUSIONS

Teaching management disciplines based on a competency-based approach is based on global trends in the development of education and is aimed not only at the reproduction of knowledge by education seekers, but above all at the use of acquired knowledge in practical activities.

Qualitative shifts in education include a modern social order for the formation of a creative personality capable of self-development, a whole

definition of key educational capacities in teaching activities, which should orient future specialists to an endless variety of professional and life situations in practical activities.

The main goal of introducing business simulations into the educational process, which takes place remotely through the training center website, is for students to acquire skills and abilities in the practical application of knowledge on enterprise management in an unstable market environment, the formation and implementation of a competitive behavior strategy.

Among the main areas through which the practical implementation of "the fifth industry" takes place, the optimization of integrated innovative achievements in the production, social and environmental spheres has been identified.

The synergy of merging human intelligence with intelligent manufacturing systems in one workflow enables exceptionally efficient, value-added production.

Conceptual transformations of the production sphere lead to the formation of a new society with the active use of augmented reality in everyday life, which completely changes the life of society.

The training of specialists for "Industry 5.0" is supplemented by key competencies, the acquisition of which is carried out on the basis of a competent approach, the logic of knowledge acquisition, the development of abstract, creative and systemic thinking, technologies for self-organization of learning, communication and decision-making to solve communicative, economic, social and ecological problems, immersion technologies for studying situations that may arise in the process of future activities, and the acquisition of skills.

SUMMARY

Teaching management disciplines based on a competent approach is based on global processes of educational development, the demands of society and business regarding the use of acquired knowledge by applicants. However, the integration of innovative achievements and their impact on the formation of the fifth industrial revolution give rise to new trends of revolutionary changes in society. Accordingly, the requirements for education and training regarding the acquisition of professional competencies of future specialists to perform tasks in various situations are also changing. The main ways of acquiring key competences in the personal, informational, research, innovative, communicative, sociocultural, industrial and digital spheres are presented.

BIBLIOGRAPHY

1. Про освіту : Закон України від 5.09.2017 р. № 2145-VIII. URL: http://zakon3.rada.gov.ua/laws/show/2145-19.

2. Компетентнісний підхід у сучасній освіті: світовий досвід та українські перспективи: Бібліотека з освітньої політики ; за заг. ред. О. В. Овчарук. Київ : К.І.С., 2004. 112 с.

3. Россоха В. В. Методика викладання маркетингу на засадах компетентнісного підходу. *Сучасна соціально-економічна система: парадигма, завдання і тенденції у 2-х частинах*: зб. наук. пр. Ніжин, 2018. Ч.2. С. 173–176.

4. *Головань М. С.* Компетенція і компетентність: досвід теорії, теорія досвіду. URL : https://core.ac.uk/download/pdf/324272272.pdf.

5. *Бахрушин В*. Компетентності і результати навчання у нових стандартах вищої освіти. URL : http://education-ua.org/ru/articles/702-kompetentnosti-i-rezultati-navchannya-u-novikh-standartakh-vishchoji-osviti.

6. *Поскрипко Ю. А., Данченко О. Б.* Компетенція і компетентність: консенсус. *Вчені записки Університету «КРОК»*. 2019. № 3(55). С. 117–127.

7. *Вагіс А.* Формування фахової компетентності студента як синергетичний процес. *Ukrainian Journal of Educational Studies and Information Technology*. Vol. 5. No 2. June 2017, pp. 5–8.

8. *Мокін Б. І., Мізерний В. М., Мензул О. М.* Формування професійної компетентності студентів в умовах професійно-практичної підготовки. *Вісник Вінницького політехнічного інституту*. 2011. № 5. С. 199–203.

9. *Westera W*. Competences in education: A confusion of tongues. Journal of Curriculum Studies.2001.Vol. 33. Issue 1, pp. 75–88.

10. *Moore D., Cheng M., Dainty A.* Competence, competency and competencies: performance assessment in organisations. Work Study.2002. Vol. 51. No. 6, pp. 314–319.

11. *Belanich J., Moses F.L., Lall P*. Review and Assessment of Personnel Competencies and Job Description Models and Methods.Institute for Defense Analyses. 2016. 33 p. Retrieved from : https://apps.dtic.mil/dtic/tr/fulltext/u2/1021552.pdf.

12. *Hagen S., van Deventer V., van Eeden R.* Beyond competence: negotiating identity and agency in the professional development of student psychometrists. South african journal of psychology. 2018. Doi: 10.1177/0081246320951687.

13. Digital competence in high school teachers as a means for educational innovation. CPU-E REVISTA DE INVESTIGACION EDUCATIVA / L. Bustos et al. 2020. Vol. 26. P. 66–86. ISSN 1870-5308.

14. *Россоха В. В. Черемісіна С. Г.* Концептуальні засади формування ключових компетентностей фахівців для «Індустрії 5.0». *Нові компетенції для Індустрії 5.0 та управління даними для закладів вищої освіти* : збірник матеріалів круглого столу. Київ : НаУКМА, 2023. С. 12–21.

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