2.1. TECHNOLOGY OF SELECTION AND STRUCTURING OF CONTENT OF PROFESSIONAL COMPETENCE DEVELOPMENT OF TEACHERS OF VOCATIONAL COLLEGES

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There is presented a scientifically grounded technology for selecting and structuring content to develop the professional competence of vocational college teachers. It defines theoretical and methodological foundations, clarifies key concepts, and outlines requirements for educational content modernization. The technology integrates goal-setting, content selection, and structuring stages, aligned with principles of scientific validity, professional orientation, adaptability, integrity, and interdisciplinary links. The implementation of this technology ensures the targeted, consistent and effective development of professional competence of teachers of vocational colleges.

2.1. ТЕХНОЛОГІЯ ВІДБОРУ ТА СТРУКТУРУВАННЯ ЗМІСТУ РОЗВИТКУ ПРОФЕСІЙНОЇ КОМПЕТЕНТНОСТІ ВИКЛАДАЧІВ ФАХОВИХ КОЛЕДЖІВ

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Представлено науково обґрунтовану технологію відбору та структурування змісту з метою розвитку професійної компетентності викладачів фахових коледжів. Визначено теоретико-методологічні засади, уточнено ключові поняття та окреслено вимоги до модернізації змісту освіти. Запропонована технологія охоплює етапи цілепокладання, добору й структурування змісту, що узгоджуються з принципами науковості, професійної спрямованості, адаптивності, цілісності та міждисциплінарних зв'язків. Реалізація цієї технології забезпечує цілеспрямований, послідовний й ефективний розвиток професійної компетентності викладачів фахових коледжів.

Keywords: *professional competence, content structuring, vocational education, college teacher, professional development, educational technology.*

Ключові слова: *професійна компетентність, структурування змісту, фахова освіта, викладач коледжу, професійний розвиток, освітня технологія.*

In the context of the challenges caused by the war with the Russian Federation, the main task of the system of professional pre-higher education is to train civically conscious, professionally competent, patriotic specialists of the middle management level, capable of successfully carrying out production activities from the first days of their work in production. Naturally, the high-quality implementation of this task determines the need for continuous, consistent development of professional competence of college teaching staff, the combination of course and inter-course advanced training measures into a single system of personal and professional growth of all subjects of the educational process.

At the same time, the answers to the problematic questions are very relevant: What should a teacher develop? What should be the content of their pedagogical activity development? What innovative knowledge should be mastered first of all? What skills and abilities, methods of professional activity should a teacher constantly improve? What should be the creative component of the content of the development of his professional competence? These questions accumulate into the problem: what should be the methodological approaches, principles, criteria, features, methods of selection and structuring of the content for the development of professional competence of college teachers', so that in their synthesis they create an effective methodology for determining innovative knowledge, abilities, skills, and methods of implementing creative pedagogical activity by each pedagogical worker for their own effective professional growth.

Recently, Ukrainian scientists have been actively studying the methodological aspects of selecting and structuring the content of education, the student's and teacher's personalities formation and development as one of the key problems of modern pedagogical theory. This problem is not new in pedagogical science: various scientific approaches to determining the principles, criteria, methods of selecting educational information, its structuring have found their reflection in the works of I. Androschuk, O. Borodienko, N. Briukhanova, Yu. Vaskov, S. Goncharenko, O. Glushchenko, O. Dzhezhula, O. Kobernyk, O. Kovalenko, D. Kovalenko,

M. Korets, O. Liashenko, V. Manko, O. Pometun, O. Savchenko, V. Steshenko, V. Ustinova, B. Furtak, A. Tsyna, etc.

Instead, scientists mainly deal with aspects of designing the content of training for students in various educational institutions. The problems of selecting and structuring the content for teacher's professional development in vocational education institutions are poorly studied. In particular, while studying aspects of the development of general education disciplines teachers' pedagogical skills in vocational education institutions, M. Kabysh (2024) concluded that the content of professional and personal growth of this group of pedagogical workers includes several components: *general scientific* (development of methodological knowledge); *psychological and pedagogical* (deepening of the psychological and pedagogical training of the teacher); *methodological* (growth of the teacher's competencies in the field of teaching methods); *subject* (expands the teacher's preparedness in a specific subject); *branch-wise* (contributes to deepening knowledge about the future professional activities of students). Despite a certain integrity of the proposed model of teacher professionalism development, in our opinion, there is a lack of specifics, real approaches to designing the content aspects for the teacher's professional growth.

Kurok's (2022, p. 309) approach to selecting the content for the development of legal competence of teaching staff at economic colleges is relevant to the current research. The author suggested taking into account the following factors when designing the content: social demand for teachers with developed legal competence, capable of ensuring a high level of legal education of students; perception of the system of goals and objectives that society puts forward for the educational sphere; scientific, technical and technological development; educational needs of pedagogical workers and students of institutions of professional pre-higher education; opportunities for creating a favourable educational environment to meet these needs; the level of professional training of teachers, their ability to master new legal knowledge and skills; the general level of legal competence of society; targeted state policy in the field of legal education of the population.

The approaches, principles, sources, criteria, and methods of designing educational content, substantiated by scientists (Holovan, 2012; Honcharenko, 2002; Diachenko, 2016; Radkevych, 2010; Radkevych, 2020; Stepanova, n.d.), in our study are defined as the theoretical and methodological basis, the basis for developing a methodology for selecting

and structuring the content of developing professional competence of teachers of professional colleges.

Therefore, the purpose of the research is specified by a number of the following tasks: based on the analysis of existing scientific research, to characterize the main ideas, directions, approaches, principles, requirements and sources of selection of the content of teacher's professional growth; to determine the goals, objectives, methods and techniques of structuring the selected information and, on these principles, to develop a technology for phased design of the content of professional competence development of teachers of a professional college.

Focusing on the labour market, on overcoming the challenges of today, currently professional pre-higher education is aimed at training professionally mobile, highly qualified, versatile professional junior bachelors, expected to act innovatively, work selflessly for the development of the Ukrainian economy. And to ensure such high-quality training of specialists is a teacher who has thorough knowledge of his academic discipline, innovative methods and technologies of teaching and upbringing, a person with high creative potential. Therefore, the development of professional competence of teaching staff in the context of a systematic combination of opportunities for formal, non-formal and informal education, selection and structuring of the content of continuous growth of college teachers' professionalism is an extremely urgent problem of professional pedagogy.

First of all, we should note that the methodology of our study was based on the unity of the following basic scientific approaches: *systemic* (the content of the development of a teacher's professional competence should be considered as a system of interconnected and interdependent elements); *activity* (only in activity can the content of the development of professional activity be mastered); *personality-oriented* (strengthening the content of humanistic, personally significant material); *competence* (the main result of a teacher's professional growth is the development of his competencies); *environmental* (provides the opportunity to recognize the educational environment as an important factor in the assimilation of the content of personal and professional development); *informational* (effective use of the potential of information activity, modern digital technologies in the acquisition of innovative knowledge, in particular in the system of informal education); *integrational* (when designing the content of the teacher's personal and competence development, it is important to provide for the

integration of the knowledge system, general intellectual and practical skills and abilities, experience of creative activity; understand and technologically predict their relationship in that the assimilation of each affects the level and quality of the assimilation of other elements of the content); *cultural* (contributes to the creation of optimal conditions for the acquisition of new cultural layers by the subjects of the educational process, allows organizing professional activity in the context of the integration of pedagogy and culture); *functional-targeted* (based simultaneously on the analysis of goals (tasks) and functions (measures) for their achievement).

Thus, the provisions of the above-mentioned scientific approaches, in particular the functional-targeted approach, require the definition of the goals of the teacher's professional growth. These aspects are pointed out by scientists (Diachenko, 2016; Radkevych, 2020; Stepanova, n.d.), proving that the design of the content of the development of competencies, professionalism, and teacher's skills is based on goal-setting (setting scientifically substantiated and practically achievable goals) and goal-fulfillment (step-by-step implementation of a system of actions aimed at achieving goals). Following Androschuk (2017), Koshuk (2019), Kurok (2022), Kabysh (2024), we defend the position that the basis of the system of goals for the professional development of a teacher of a professional college is a general goal, which is detailed by a number of strategic, tactical, and operational goals and determines intermediate results at each level of goal-setting.

In turn, the achievement of the general goal is ensured through the implementation of lower-order goals. A similar approach to the "hierarchy" of goals was applied in the study by Borodienko (2018), which substantiated the system of development of professional competence of managers of structural units of enterprises in the communications sector. The scientist, based on the well-known taxonomy of goals by Bloom (1956), argued that the "tree of goals" should combine strategic goals (allocated on the basis of the requirements of professional standards, qualification characteristics of these specialists), tactical level goals (development of structural components of professional competence of managers of structural units of enterprises in the communications sector) and goals of the "level of operational goal setting" (Borodienko, 2018, p. 283) (setting individual tasks, conducting control and evaluation measures, etc.). Agreeing in general with such a hierarchy of goals, it is worth pointing out the possibility of partial comparison of some strategic and tactical goals (for example, regarding the

volume of knowledge or intellectual abilities and skills).

The scientists indicate (Kabysh, 2024; Radkevych, 2020; Titova, et al., 2023) that when setting goals, it is important to adhere to certain requirements. Most often, such requirements for the formulation of these motivational and semantic formations of the personality are called clarity, diagnosticity and hierarchy. The clarity of goals reflects the completeness of understanding, clarity and specificity of ideas about the predicted result, characterizes the reality (or unreality) of its achievement; diagnosticity (measurableness) of goals requires their formulation as the results of a certain activity, which can be recognized, measured according to the accepted assessment scale; the hierarchy of goals involves considering imaginary results from the standpoint of subordination of lower levels to higher ones, when stages of achieving lower-order goals are planned to achieve the main (leading) goals. In addition to the above requirements, when formulating goals, scientists suggest keeping in mind their following characteristics: *instrumentality* (goals should be defined in terms of the process under study, professional training of specialists, development of teacher professionalism, etc.); *realism* (requires taking into account the means of achieving goals, thereby guaranteeing the possibility of their achievement); *adequacy* (guarantees compliance of the goals with the educational results obtained, i.e. directs pedagogical interaction to the implementation of the requirements and educational levels defined in the standard).

Finally, it is worth mentioning SMART, a method of goal setting, developed in 1954 by New York University professor P. F. Drucker (SMART-goal setting or how to make any task achievable?, n.d.). The requirements for correct goal setting in any activity are written out by the letters of the abbreviation of the name of the method, in particular: S (specific) means the goal must be precise, clearly defined, concrete, unambiguous and single-vector in terms of its achievement; M (measurable) means it is necessary to clearly justify the criteria for achieving the goal to measure the results of its achievement: if such measurement is possible, the effectiveness of each stage of goal fulfillment should be assessed; A (achievable) means that even at the stage of goal setting, it is necessary to make sure of its reachability. However, the goal should be neither easy nor too difficult to achieve: before accepting the goal, it is important to take into account your capabilities and resources, to act according to the principle “although it is difficult, but possible!”; R (relevant), when the goal must be

realistic: we set ourselves only such tasks that we can solve (we should not plan to create a Perpetuum Mobile, a perpetual motion machine, because we know in advance that this project will fail); T (timed), when we should fix the time by which the goal must be achieved, the task set must be completed; but at the same time, we should not exaggerate or underestimate the time for completing the task.

Finally, at this stage of the study, we must make the following generalizations: to select the content of the college teachers' professional competence development, it is necessary to determine the goals of this process, which we must formulate through the results; at the same time, to achieve the results of the professional development of teaching staff, it is necessary to develop a "pedagogical taxonomy" that reflects the structure of goals as a construct of successive hierarchical levels; it is necessary to clearly, specifically and understandably describe the goals of each level of the hierarchy.

Based on the above-mentioned provisions and the approaches of scientists to justifying the goals of increasing the professionalism of specialists (Diachenko, 2016; Kalenskyi et al., 2018, Stepanova, n.d.), we conclude: the basis of the system of goals for the development of professional competence of college teachers is the main goal, which, on the one hand, is detailed by a set of strategic, tactical and operational goals and determines intermediate results at each level, and on the other hand, is achieved through the consistent, phased implementation of lower-order goals. At the same time, we understand the professional competence of a teacher of a professional college as "… an integrative property of the personality, which is manifested in the pedagogical activity, behaviour and actions of a specialist and determines his readiness and ability to competently perform his professional functions due to a balanced combination of a complex of methodological, psychological-pedagogical, methodological, organizational, subject-industry (special), environmental, legal, etc. knowledge, skills of educational and methodological work, skills of education and development of students' personality, necessary pedagogical abilities, moral and ethical values and professional qualities (creative attitude to educational activity; reasonable love for students; perseverance and purposefulness; responsibility; endurance; self-control; tolerance, kindness; pedagogical observation and attentiveness; perfect command of language and thinking; inspiration and intuition; optimism; pedagogical tact; health and appearance, etc.) and determines sufficient levels of upbringing and

education of applicants for professional pre-higher education" (Titova, et al., 2023, p. 32).

To formulate the main goal of developing the college teacher's professional competence, it is appropriate to recall that Article 62 of the Law of Ukraine "On Professional Pre-Higher Education" contains the following requirement (2020): "Pedagogical, scientific-pedagogical and scientific workers are obliged to: constantly improve their professional and general cultural level and pedagogical skills, ensure continuous professional development". We support the views of Kurok (2022) that the main goal of developing the pedagogical activity of teachers is always set from the outside and is formulated taking into account the requirements of legislative or subordinate regulatory legal acts, professional standards, the mission and strategy of the activities of professional colleges, factors that determine the directions and content of the professional growth of pedagogical workers. Therefore, *the main goal* of the studied process is the continuous development of the professional competence of pedagogical workers of professional colleges in order to ensure high levels of growth of their skills, creative abilities, and abilities to effectively organize a holistic educational process.

As mentioned above, to achieve the main goal, it is necessary to isolate the elements of the lower-level "taxonomy", in particular strategic goals. Naturally, in order to holistically develop the professional competence of a teacher as an integrative property of a person, it is necessary, in our opinion, to recognize the components of the phenomenon under study as objects of pedagogical influence such as motivational-value, cognitive-informational, behavioral-activity, personal-reflective, emotional-volitional components (Titova, et al., 2023).

Accordingly, *the strategic goals* of developing the professional competence of teaching staff of professional colleges are: a) the formation of motives, aspirations for innovative pedagogical activity, value orientations of the teacher to master high levels of professionalism; b) a complex of versatile theoretical and empirical knowledge (pedagogy, psychology, teaching methods, digital technologies, in the scientific field being taught, etc.); c) a wide range of cognitive and practical skills/skills for performing actions and operations to implement labour functions in the educational process of a professional college; d) developed personal and professional qualities (pedagogical observation and attentiveness; inspiration and intuition; optimism; responsibility; self-control; tolerance,

kindness; pedagogical observation and attentiveness; pedagogical tact, etc.), the ability to regulate one's own life activities, the formation of reflective qualities; e) persistence in self-improvement, emotional stability, determination, endurance, the ability to understand one's own emotional state when solving problematic pedagogical situations.

Analysis of strategic goals shows that they are long-term, calculated and long-term, and determine more specific tasks and ways to achieve them - tactical goals. In the proposed taxonomy (Figure 2.1), these goals should determine a certain level of development of components-varieties of the teacher's professional competence. Such components are distinguished on the basis of the functions of pedagogical activity (educational, methodological, educational, communicative, etc.). Accordingly, tactical goals are aimed at the development of abilities, which in synthesis determine the level of growth of the teacher's professional competence.

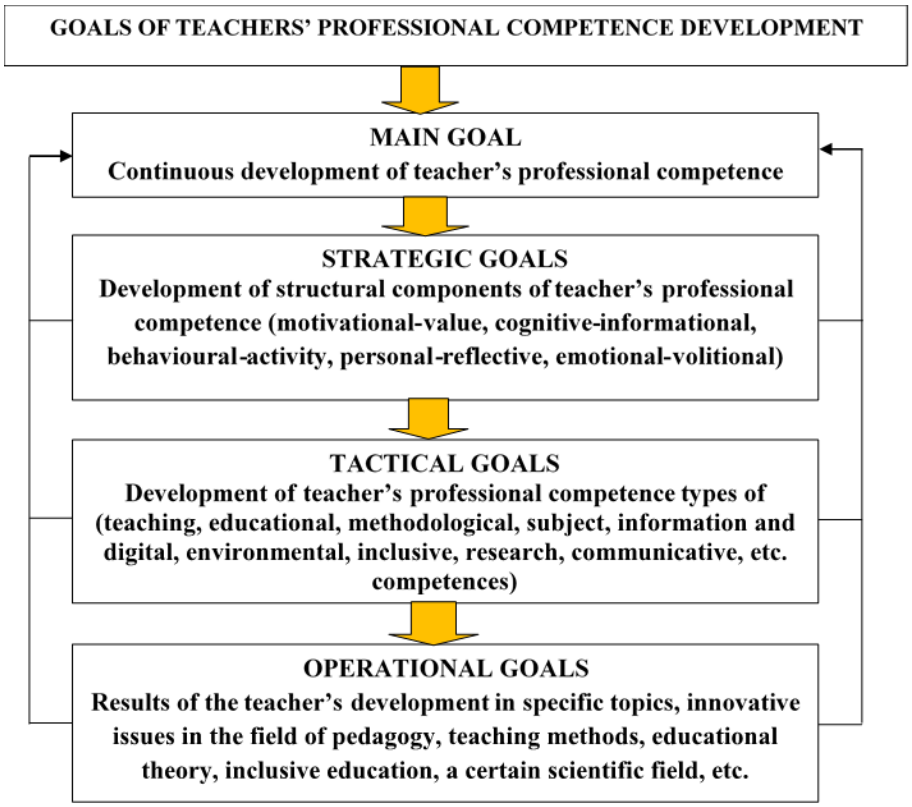

Figure 2.1
Hierarchy of goals for the college teacher's professional competence development.
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The main ones are the following (Titova, et al., 2023, p. 33–34): *teaching* competence as the teacher's ability to teach others, that is, to transfer their own knowledge, to form skills and abilities in students, as well as the ability to learn, that is, to improve their professional level; *educational* competence is an integrative personal and activity quality of a teacher, which ensures his theoretical and practical readiness and ability to effectively implement the educational function in a holistic educational process; *methodological* competence is the teacher's ability to develop educational and methodological documentation, methods of preparing and conducting educational classes, other didactic materials and teaching aids; *subject* competence is the teacher's theoretical and practical readiness to teach a separate discipline, course, etc.; *information and digital* competence as the teacher's ability to navigate in the information space, receive and operate information, and apply digital technologies in the college's educational process; *environmental* competence is the ability of a person to apply environmental knowledge and experience in professional and life situations, guided by the priority of environmental values and non-pragmatic motivation for interaction with the environment; *inclusive* competence is the teacher's ability to pedagogically support students with special educational needs, taking into account their individual needs, capabilities, abilities and interests, to create conditions that ensure the functioning of an inclusive educational environment of the college; *research* competence involves the ability of an individual to conduct scientific research in a certain field of science, in a certain specialty, using general and special scientific methods; *communicative* competence of a teacher is the ability of a person to choose and technologically effectively apply an adequate method of oral and written communication.

In the proposed structure, operational goals are at the lowest level and ensure the achievement of tactical and strategic goals for the development of professional competence of a college teacher. They are short-term and reflect the results of teachers' work on specific topics, innovative issues in the field of pedagogy, teaching methods, educational theory, inclusive education, a certain scientific field, etc. Usually, such goals are achieved by means of self-development or in the system of methodological work of a college, while strategic and partially tactical goals are achieved comprehensively, in particular in postgraduate education.

Analysis of the main theories of designing the content of education (theory of material education; theory of formal education; utilitarian concept

(didactic utilitarianism); didactic exemplarism, theory of the unity of material and formal education; theory of the cultural orientation of education, etc. (Haluziak et al., 2007)), modern approaches to solving the specified problem (Zmist osvity v natsionalnii shkoli, n.d.), Kalenskyi et al., 2018, Pukhovska et al., 2015), own scientific research allow us to highlight the following main principles of designing the content of developing the professional competence of teachers: *humanism* (compliance with this prescription ensures the priority of universal human values and personal values); *scientificity* (the content of training, education and development of the personality is built on a scientific basis, corresponds to the latest achievements of science, is characterized by demonstrability, objectivity, accuracy and clarity of conclusions); *sequence* (planning and logic of content deployment is carried out so that new knowledge is based on and follows from the previous one; *systematicity* (the content of the programs for the development and self-development of the teacher's professional competence should combine the possibilities of formal, non-formal and informal education); *connection with life* (the content should reflect the connection between theory and practice, and intellectual and practical skills should be the goal of mastering the educational material; *accessibility* (the complexity of the content should be such that the students can overcome it with their cognitive abilities: not easy, but not too difficult); *expediency* (the volume of the content of the educational material should correspond to the allotted time for its mastery; be sufficiently informative to meet the needs of both the teacher's personality and society as a whole; be useful, necessary, relevant for the organization of the teacher's pedagogical activity in this college; *individualization and differentiation* (the content should be selected so that independent work can be individualized according to the interests and abilities of each pedagogical worker); *historicism* – (the foundations of sciences should be highlighted in the sequence of their historical development, and the contribution of Ukrainian scientists to solving scientific problems should be shown).

The criteria for selecting the content of education are, in comparison with the principles, less general in nature, they are those distinctive features that should be taken into account when informatively filling certain content components. In accordance with the basic principles, requirements for designing the content of education (Androshchuk, 2017; Holovan, 2012; Kurok, 2022), the following criteria for selecting and structuring the content of the development of professional competence of pedagogical workers of

professional colleges have been determined: a holistic reflection in the content of education of the goals (strategic, tactical, operational) and tasks of personal and professional development of teachers; scientificity and practical significance of the content included in the programs of advanced training, professional self-improvement of teachers; correspondence of the volume of content to the time available for its mastery both in course training and in the inter-course period; consideration when designing professional development programs for teachers of the availability of pedagogical education among students; taking into account positive international experience of corporate training (such as the concept of a "learning organization" (Zholonko, 2020; Pukhovska et al., 2015; Hernandez, 2001; Kritsonis, & Smith, 2006), technologies for professional development of teachers/instructors/trainers (Borodienko, 2018), etc.; compliance of the content of education with the existing material and technical base of the professional college, etc.

A well-founded taxonomy of goals, defined principles and criteria encourage the development of a detailed technology for selecting and structuring the content of professional competence development of college teachers. In this case, along with the term "selection and structuring", we will use the concept of "designing" content, which is defined as "… the activity of selecting adequate pedagogical solutions, the effectiveness of which has theoretical and practical confirmation, as well as their detailed, consistent and substantiated presentation, which embodies the concept of a pedagogical project" (Ilin et al., 2010, p. 301). In the process of experimental work, the technology of designing the content of professional competence development of the studied group of pedagogical workers was tested, consisting of 5 stages and 10 steps (Figure 2.2).

To develop an effective, targeted technology for designing the content of professional competence development of teachers of a professional college, it is necessary to:

1. Study and analyse in detail: the sources of selection of the content of teachers' education (science, spiritual values, forms of social consciousness, production of material and spiritual goods, experience of social relations, areas (types) of activity of a specialist, etc.); take into account when developing the technology subjective and objective factors that influence the content of education and self-education of teachers (current and prospective needs of society in teachers; ideology and politics: through professional pre-higher education, some groups try to strengthen their

influence on society; state strategy for the development of professional education; system of social and scientific achievements; theories of education, methodological positions of scientists, their interpretation of the problem of the development of pedagogical activity; real possibilities of the modern educational environment of the college; pedagogical experience of teachers; level of development of the relevant scientific field, technology, production); taxonomy of the goals of the development of professional competence of teachers of a particular professional college;

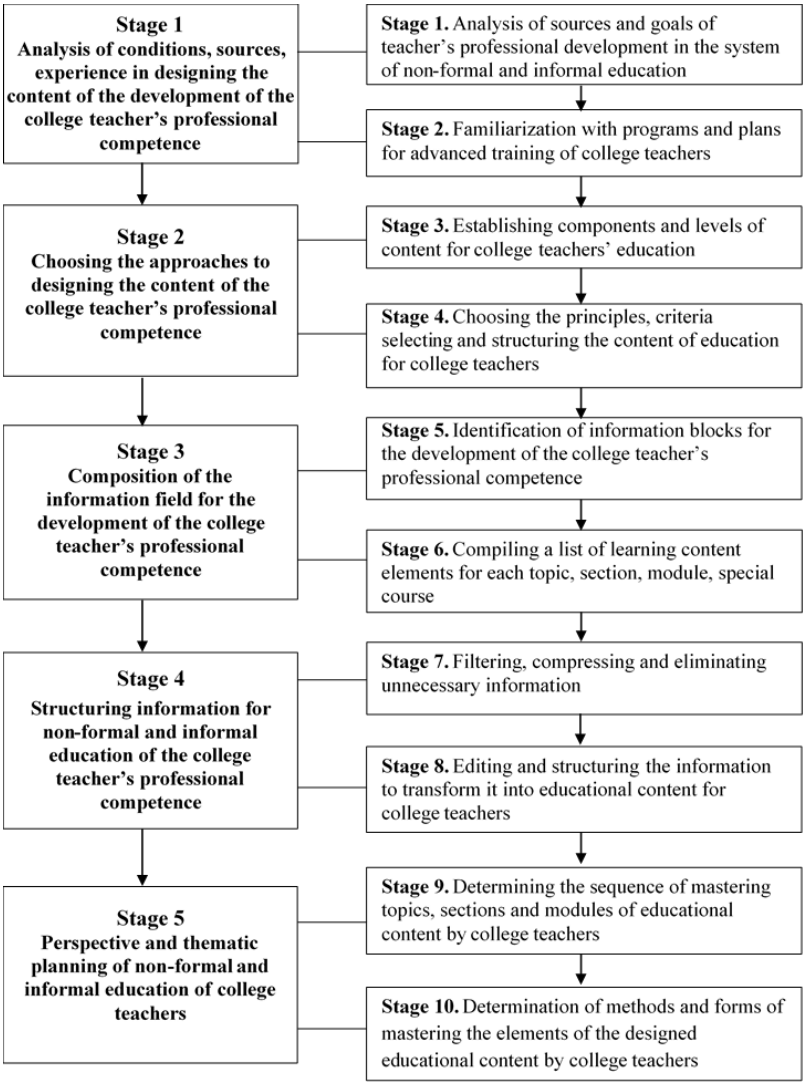

Figure 2.2
Technology of designing content for the development of professional competence of a college teacher.
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2. Get acquainted with the programs of advanced training courses for teaching staff in postgraduate education institutions, the relevant practice of organizing methodological work in professional colleges, the positive experience of advanced training for teaching staff through non-formal education (preparation and conduct of seminars, trainings, workshops, intensives, interactive classes in schools of pedagogical skills, organization of mentoring, etc.), existing self-improvement programs for teachers, etc.

3. Determine the structure of the content of education, its components (types); the components of the types of education include (Kabysh, 2024): a) a system of knowledge about nature, society, thinking, technology, methods of activity, the assimilation of which ensures the formation and development of a scientific worldview, equips a person with a dialectical-materialist methodological approach to cognitive and practical activity; b) a system of general intellectual and practical skills and abilities, experience of the implementation by a person of known methods of activity; c) experience of creative, exploratory activity in solving new social problems; d) experience of emotional-volitional attitude to the world, to oneself, to people, which, together with skills and abilities, is a necessary condition for the purposeful development of a system of personal values.

4. Determine the principles and criteria for selecting and structuring the content of professional competence development for teachers of a professional college (see above);

5. Based on the analysis of the functions, goals of pedagogical activity, requirements of the professional standard (qualification characteristics), structure of types of professional competence, select information for professional development (self-development) of a certain group of pedagogical workers (general education teachers; teachers of professional disciplines; masters of industrial training, etc.); in the content of the special course, module, topic, the following blocks should be distinguished (Zmist osvity v natsionalnii shkoli [Content of education in the national school], n.d., 308): a) basic terms and concepts, without which no provision of science can be understood and consciously mastered; b) scientific facts, without knowledge of which it is difficult to understand the laws of science, form beliefs; c) basic laws, provisions, principles that reveal the essence of phenomena considered by a certain scientific field, objective connections between them; d) theories that contain the system of scientific knowledge, methods of explanation and prediction of phenomena of the field being

studied; e) knowledge about the object and subject of a certain science, methods of cognition and the history of its development.

6. Based on the selected information, compile a list of elements of the learning content of each topic, section, module (concepts, phenomena, properties, objects, facts, events, statistics, examples, quotes, analogies, laws, patterns, connections, dependencies, principles, rules, formulas, algorithms, schemes, proofs, techniques, methods, procedures, instructions, etc.). For example, we will give selected elements of the learning content from the disciplines: "Inclusive Education", "Pedagogy". "Agricultural Machinery":

A. The elements list for the content of the training on the topic ***"Learning technology in an inclusive educational environment. Cooperative learning"*** (Chapter 4. "Organization of the educational process in inclusive education" Poroshenko, 2019): *cooperative learning (CL); small groups; organization, stages of CL; criteria for successful CL (positive dependence; direct support; responsibility; social competence; self-assessment); forms of CL (basic, formal, special, informal groups); tasks of the teacher in CL; the role of the teacher as a facilitator; planning, conducting, analysis of the lesson; types of technologies (exercises) of CL ("Circle of Consent"; "Surround a Wise Person"; "Find Someone Who..."; "True or False"; "Flash Card Game"; "Formation"; "Brainstorming for Four"; "Internal and External"; "Puzzle"; "Line Up"; "Repeat After Me"; "Discussion in Pairs"; "Traveler"; "Check in Pairs"; "Comparison in Pairs"; "Paraphrasing"; "Partnership"; "Poems in Two Voices"; "Send a Problem"; "Let's Spend a Quarter"; "Talking Chips"; "Team Interview"; "Team Consulting"; "Team-Pair-Solo"; "Team Statements"; "Word Network"; "Telephone"; "Let's Think and Exchange"; "Exchange with three"; "Exchange in pairs with limited time"; "Who am I"); distribution of exercises; features, advantages of CL.*

B. The list of elements of the content of the training on the topic ***"Control of students' educational and cognitive activities"*** (Ilin et al., 2010): *"Control, diagnostics, monitoring, accounting, verification, evaluation, assessment, control functions (educational, diagnostic, educational, developmental, stimulating, managerial), control principles (systematicity, objectivity, comprehensiveness and comprehensiveness, individual approach, differentiation, variety of forms and methods), types of control (preliminary, current, thematic, periodic, final, machine, individual, group), classifications of control types, control methods (oral survey, written*

control, graphic control, practical control, test control, computer testing), forms of control (exam, credit, course work, course project, diploma thesis, industrial practice), types and types of standardized test tasks, levels of educational achievements (receptive-productive, reproductive, constructive-variative, creative; according to B. Bloom, knowledge, understanding, skills, analysis, synthesis, evaluation), assessment criteria, quality of knowledge, rating, intermediate rating, final rating, grades on the ECTS scale".

B. List of elements of the content of the training on the topic ***"Machines for soil cultivation: plowshares, machines for soil protection system of agriculture"*** (Ilin, Luzan, & Rudyuk, 2010)**:** *soil cultivation; soil cultivation machines; types of soil cultivation (main; surface, special); method of soil cultivation (crushing, cutting, loosening, compaction, mixing, leveling, rotation); soil cultivation system (traditional, conservation, mulching, with mini-till elements); classification of soil cultivation machines (machines for main soil cultivation, surface and special purpose); plow; agrotechnical requirements for plows; plowshares; working bodies and auxiliary elements of plows (housings, skidders, knives, soil deepeners); purpose of the plow body components (share, shelf, field board, post, shoe); types of share (trapezoidal; chisel-shaped); shelves with a cultural surface (semi-screw, screw, cylindrical, rhombic); safety mechanisms and devices, their types and principle of operation; general structure, working process and adjustment of the share-shelf plow (PLN-5-35; PLN-3-35; PUM-5-40); reversible plows – structure, work process (PO-3-40, Vari-Diamant 160; plow-huller PL-4-30 (structure, work process); row plow PNYA-4-40; machines for the soil protection system of agriculture – flat cutters-deep cultivators, chisel plows, ridge cutters, needle harrows: purpose, general structure, working bodies, work process, adjustment; layout schemes of working bodies and auxiliary parts on the plow frame; preparation of the plow for work; safety measures; prospects for the development of plow designs.*

It is important to emphasize that the content of both humanitarian and technical disciplines should cover various types of knowledge, which in the system are aimed at creating a general picture of the world, and subsequently serve as effective tools for carrying out practical and cognitive activities.

Filtering, compression and exclusion of unnecessary information that is not directly related to the achievement of educational goals: here it is necessary to make sure whether the planned volume of educational information can be mastered by the pedagogical worker in a certain time; if

not, then from the entire information array only that information is selected that will contribute to the achievement of the set goals; if necessary, a procedure is carried out to reduce some messages without significantly changing their content (information compression) (Koshuk, 2019).

Editing and structuring information: at this stage of designing the content of education, information is edited (restructuring facts, detailing, supplementing with examples of practice, explaining complex objects, phenomena, processes) and a structural and logical scheme (Koshuk, 2019) of the content of the training of a certain topic, section, module is developed;.

Determining the sequence of mastering topics, questions, content elements by those who study (matrix analysis, graph-analytical method, expert assessment, pedagogical experiment, etc.);

Establishing relationships between content components and methods, forms of its mastery by students.

Undoubtedly, the selected content is an extremely necessary, but far from sufficient means of achieving the set goals. The results of our research convince us that the effectiveness of the professional development of teaching staff is influenced by a number of interrelated and interdependent factors, in particular: the content of education (*what knowledge, skills, abilities, personal qualities, values should be formed, deepened, expanded?*); methods of teaching, self-education (*what methods, techniques should we use to achieve the set goals?*); forms of learning, upbringing, personality development (*where, when, how and for how long should the purposeful development of the teacher's creative potential be carried out?*); means of education (*which subjects of the college educational environment or subject situations should be used in the process of personal and professional growth of the teacher be carried out?*); pedagogical activity of the teacher (*is the teacher sufficiently motivated and continuously developing his pedagogical skills, does he have the skills to independently master innovative knowledge?*); professionalism of teachers – mentors, coaches, tutors, trainers (*who is involved in giving lectures, conducting seminars-webinars, trainings, is their level of pedagogical skills sufficient?*); educational environment of the college (*does the college have an effective system of advanced training of pedagogical staff, are novice teachers and young teachers involved in training in schools of pedagogical skills, pedagogical workshops; how productively does the college's methodological service organize "corporate training" of pedagogical staff?*), etc.

When designing the content of education, it is extremely important to take into account the methods by which the knowledge, skills and abilities of those who study should be formed/developed. This means that it is necessary to reveal the interrelationships of the methods and types (components) of assimilation of the content, to show what methods and techniques of learning should be provided for the assimilation of the proposed material by teaching staff.

The types of educational content just indicated are those elements with which scientists recommend saturating cognitive and practical tasks for those who study. This means that educational results should include not only knowledge, skills and abilities, but also the experience of creative activity acquired by students. In addition, the content of educational tasks should take into account the emotional factor, the level of development and the nature of the cognitive needs and motives of the individual. The question rightly arises: how to do this methodically?

First of all, when constructing educational tasks, one should foresee the content of the methods of activity determined by the methods of teaching. Let us recall: teaching methods are methods of orderly interconnected activities of teachers and pupils (students, listeners), aimed at achieving the set goals; by the nature of the cognitive activity of those who learn, the methods are classified into explanatory-illustrative, reproductive, problem-based, partially-search, and research. Without commenting on the classification of methods by other features, let us briefly dwell on the content of the listed methods of educational activity.

It is worth agreeing that the acquisition of knowledge and skills is carried out at three levels (Haluziak et al., 2007; Kozakov et al. 2003): conscious perception, understanding and memorization, which is manifested in sufficient accuracy of reproduction; application of knowledge (skills) according to a model or in a familiar situation; creative application of knowledge (skills) in a new, previously unfamiliar situation. Naturally, these three levels of learning the content of education are closely interconnected, but can be successfully implemented separately. In any case, they should be clearly distinguished. Otherwise, there is a risk that the creative application of knowledge and skills will not be given enough attention (usually educational practice uses, unfortunately, the first two levels of learning educational information). This is first. Secondly, when learning knowledge and methods of activity at any level, it is necessary for students to learn emotionally, to experience acts of cognition as a personally meaningful

activity. In other words, it is necessary to constantly “feed” interest in both the knowledge itself and the process of mastering it. And, thirdly, the interest just mentioned in learning and in the objects of learning should be considered an educational result along with the results of other levels of learning information.

At the first level of assimilation of educational content, learning is divided into the following general links: a) communicating the conditions of the cognitive task (task), creating learning stimuli in students; b) perception by those who are learning of new material from various sources, comprehension and generalization of new knowledge (new methods of activity); c) consolidation and improvement of new knowledge (methods of activity) – memorization. In this case, the activity of the teacher and the student (student, listener) has all the signs of explanatory-illustrative (informational-receptive) learning - listeners are informed of ready-made information by various means, they must perceive, comprehend, consolidate in memory terms, scientific facts, basic laws, provisions, principles of a certain theory, etc.

Established for centuries, explanatory and illustrative teaching is called the most economical (I. Lerner) way of “transferring” knowledge, mastering methods of activity. For this, a palette of teaching tools and methods is used: oral word (explanation, story, information message, lecture); printed word (textbook, teaching manual, methodological recommendations, reading books, etc.); visual aids (natural objects, pictures, maps, presentations, etc.); practical demonstration of methods of activity (demonstration of methods of proving theorems, deriving formulas, drawing up business plans, demonstrating work on a machine tool, operations of technological adjustment of units, etc.).

Separately, it should be said about modern teaching aids that use digital technologies, electronic educational resources. According to their functional characteristics, they are divided into electronic educational publications (electronic version of a printed textbook, electronic textbook, electronic workshop, electronic reader, electronic lecture course, electronic training manual, etc.); electronic reference publications (electronic reference book, electronic encyclopedia, electronic dictionary, etc.); electronic practical publications (collection of virtual laboratory works, electronic methodological recommendations, electronic workbook, etc.). The use of electronic educational resources provides “... the content filling of the educational space, providing equal access to participants in the educational

process regardless of their place of residence and form of education in accordance with high-quality educational and methodological materials created on the basis of information and communication technologies" (On amendments to the Regulation on electronic educational resources, 2019). Much attention has been paid to electronic educational resources in scientific and methodological literature, and the task is to ensure that the use of these modern teaching aids is didactically competent, benefiting the development of intellectual abilities, cognitive independence, and initiative of those who study.

Mastering the content of education when using explanatory and illustrative methods does not involve the formation of skills and abilities to apply the acquired knowledge in practice. However, without this method, it is impossible to form any intellectual or practical skills: the performance of an action must always be based on a certain minimum of knowledge about the object (subject), conditions, means of performing operations, etc. Therefore, the explanatory and illustrative method fundamentally precedes the reproductive method, which is intended to achieve the second level of mastering the content of education. Its essence is explained by the following procedure: the teacher, using a system of educational tasks, organizes the educational and cognitive activity of students regarding the repeated reproduction of the communicated knowledge or the shown methods of activity. Therefore, the reproduction and repetition of intellectual or practical action during the organizing, motivating activity of the teacher is the main feature of the reproductive method (I. Lerner).

Instead, the exercise should not be a mechanical, automatic repetition of intellectual or practical actions, but a conscious active activity of the one who masters a certain skill. In this case, psychologists advise (Kozakov et al. 2003) to avoid monotony of actions, to diversify the course of exercises through the gradual complication of the content of the tasks, changing the speed of performing the exercises, using competition between the participants in the exercises, etc.

Here is an example of using exercises in the development of teachers' research competence (*Advanced training. Topic "Methodology of pedagogical research". Detachabloed Subdivision "Nemishayeve Professional College of National University of Life and Environmental Sciences of Ukraine", October 2024*). After a detailed explanation of the expert assessment methodology, in particular ranking (arranging factors, conditions, criteria, principles, etc. in ascending or descending order

according to their significance in the formation or development of the studied object, phenomenon, process), the students were involved in performing exercises to develop skills in compiling a rank matrix. During the instruction, the students were instructed: *"To correctly use the results of the examination and predict solution options, the researcher must learn to summarize, group and analyse the information received from the experts. When experts perform the ranking, it is necessary to correctly, without any errors, compile a rank matrix and determine the dominant objects under consideration. Each of you received a table with ranking data of 11 factors of activating students' educational and cognitive activity by 10 conventional experts. We observe that the experts were unable to distinguish some factors by weighting-significance. Let's try to determine the values of the "linked" ranks and, accordingly, create a matrix - fill in table 2 of the results of the experts' ranking of factors."* For the sample, the initial data for performing the exercise by an individual listener are given in Table 2.1, and the results of converting this data into factor ranks are in Table 2.2.

Table 2.1

Summary of the expert examination of factors activating students' educational and cognitive activity

No. of an expert	No. of a factor										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
I	1	8	2	1	7	10	5	3	6	4	9
II	2	7	1	2	8	9	6	4	5	3	10
III	3	9	2	1	7	8	6	5	4	3	10
IV	1	7	1	1	6	9	5	3	4	2	8
V	1	7	1	2	5	8	6	4	3	2	9
VI	1	5	2	1	3	6	4	2	2	1	7
VII	2	6	1	2	4	6	5	3	3	1	7
VIII	1	6	1	1	4	5	3	2	2	1	7
IX	1	9	2	3	5	4	8	7	6	6	10
X	1	7	2	4	6	5	8	8	7	3	8

Note. Created by the author.

Table 2.2
Factor ranking matrix (created based on data from Table 2.1)

No. of an expert	No. of a factor											$\sum_{ij}^{n} F$
	1	2	3	4	5	6	7	8	9	10	11	
I	1,5	9	3	1,5	8	11	6	4	7	5	10	66
II	2,5	8	1	2,5	9	10	7	5	6	4	11	66
III	3,5	10	2	1	8	9	7	6	5	3,5	11	66
IV	2	9	2	2	8	11	7	5	6	4	10	66
V	1,5	9	1,5	3,5	7	10	8	6	5	3,5	11	66
VI	2	9	5	2	7	10	8	5	5	2	11	66
VII	3,5	9,5	1,5	3,5	7	9,5	8	5,5	5,5	1,5	11	66
VIII	2,5	10	2.5	2.5	8	9	7	5,5	5,5	2.5	11	66
IX	1	10	2	3	5	4	9	8	6,5	6,5	11	66
X	1	7,5	2	4	6	5	10	10	7,5	3	10	66
$\sum_{ji}^{m} F$	**21**	**91**	**22,5**	**25,5**	**73**	**88,5**	**77**	**60**	**59**	**35,5**	**107**	660

Note. Created by the author.

It is not difficult to notice that each student had to perform the same action (transforming expert data into ranks) at least 11 times (this is in the case when at the end the sums of columns and rows are equal to $\sum_{ji}^{m} F=\sum_{ij}^{n} F=660$; otherwise, it is necessary to find an error and repeat the procedure again). Practice shows that only conscientious practice in determining ranks allows you to consolidate this simple, at first glance, method in memory. An interested reader can verify the correctness of what was said by trying to perform the exercise on their own. As can be seen from Figure 2.3, explanatory-illustrative and reproductive methods are used to master 1 and 2 types of educational content. At the same time, applicants master ready-made and reproduce (reproduce) methods of activity already known to them. But neither a significant amount of knowledge mastered in a ready-made form, nor skills and abilities mastered according to a model, provide the disclosure and growth of a person's creative abilities. Experience of creative activity in solving new problems is acquired by students when applying problem-based learning methods – problem presentation, partial search (heuristic) and research methods. These methods are described in

sufficient detail in the methodological works of modern scientists (Luzan et al., 2016), so we will focus only on their general features.

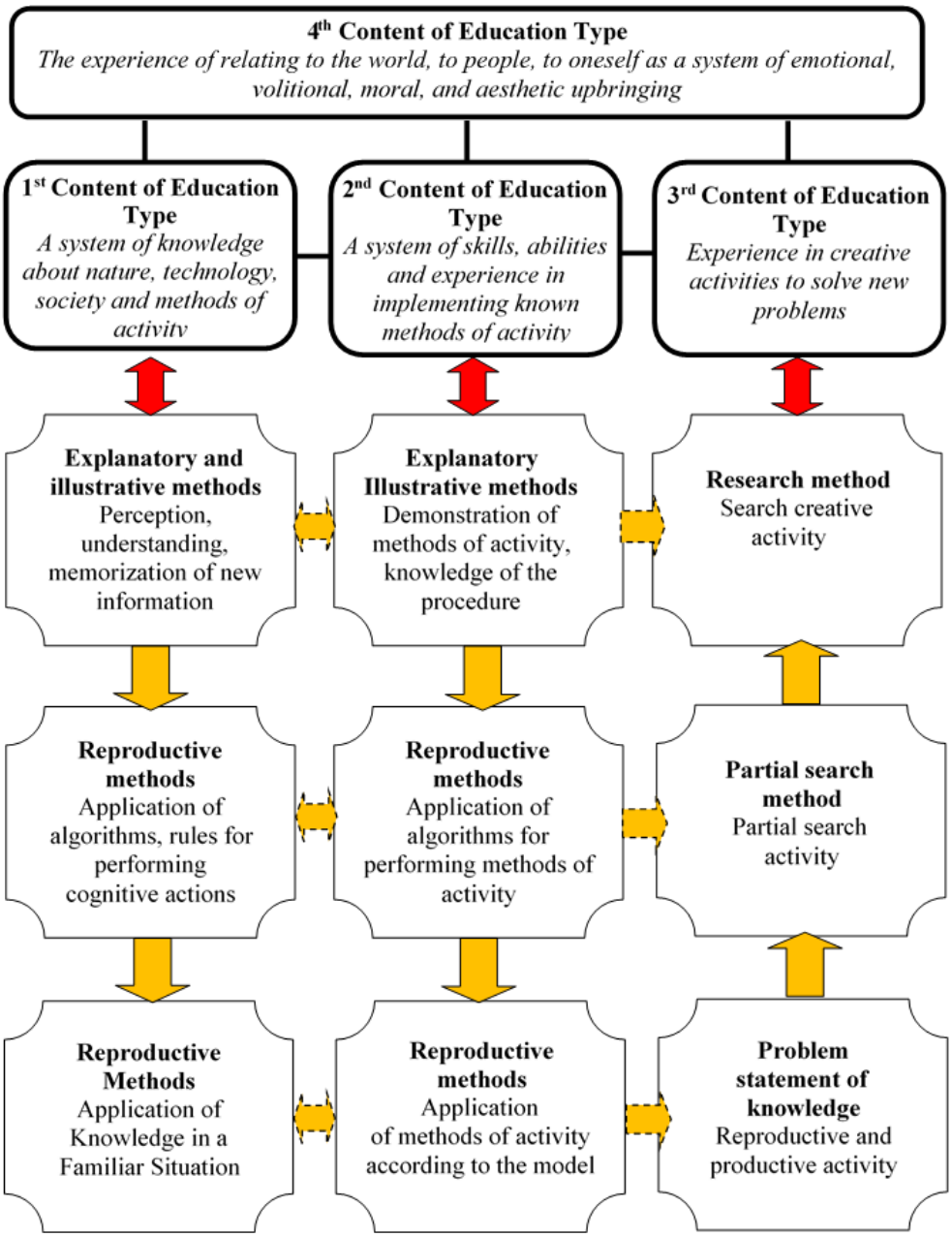

Figure 2.3
Diagram of the relationship between methods and levels of mastering the content of education.
Note. Created by the author.

The content of education in the form of experience of creative activity does not coincide in essence with the content of the first two types. The fact is that a student who has mastered knowledge in a "ready-made" form, according to a model, does not have experience in solving problems independently, he is usually not able to apply his creative abilities in non-standard, new situations. Here it is advisable to support those psychologists who claim that every person has natural creative abilities: "… creative inclinations exist in the brain of every person… spontaneous manifestation of the need and ability to be creative manifests itself when combining some favorable neurophysiological predispositions" (Amelkin et al., 2010, p. 12). Therefore, creativity should be taught by means of any subject, constantly and systematically preparing, in particular, graduates of a professional college for creative professional activity.

The special features of such activity are (Amelkin et al., 2010, p. 12; Haluziak et al., 2007): independent transfer of knowledge and skills to a new situation; vision of a new function of the object; alternativeness, flexibility of thinking; speed of thought, originality, curiosity, accuracy and courage; high efficiency, subordination of creativity; spiritual motivation, resilience, stubbornness, passion for work; ability to find contradictions; independence; ability to self-manage.

Conclusion. So, the proposed technology for selecting and structuring the content of education gives an answer to the question: what information needs to be selected so that its mastery by pedagogical workers will allow achieving the set goals, developing educational, methodological, educational, inclusive, environmental and other types of professional competence of a teacher of a vocational college. The use of the proposed technology by the management of institutions of vocational pre-higher education, methodological services allows, in our opinion, not intuitively, but on a scientific basis, systematically and purposefully to design the personally-oriented content of the development of the professional competence of each teacher or master of industrial training in accordance with his needs, motives, preferences. The prospects of further scientific explorations will be devoted to the development of a detailed technology for the development of innovative competence of college teachers.

References

Kabysh, M. Yu. (2024). *Systema rozvytku pedahohichnoi maisternosti vykladachiv zahalnoosvitnikh dystsyplin zakladiv profesiinoi osvity: Dys. … d-ra ped. nauk [The system of developing the teaching skills of teachers of general education disciplines in professional education institutions: Doctoral dissertation]*. Kyiv.

Kurok, R. O. (2022). *Rozvytok pravovoi kompetentnosti pedahohichnykh pratsivnykiv ekonomichnykh koledzhiv: teoriia i metodyka: Monohrafiia [Development of legal competence of teaching staff of economic colleges: Theory and methodology: Monograph]*. TOV "TsP Komprynt".

Holovan, M. S. (2012). Teoretychni osnovy formuvannia zmistu profesiinoi osvity maibutnoho fakhivtsia finansovoho profiliu [Theoretical foundations of content formation of professional education of a future finance specialist]. *Problemy suchasnoi pedahohichnoi osvity. Seriia: Pedahohika i psykholohiia, 36*(1), 3–10.

Honcharenko, S. U. (2002). Dydaktychna kontseptsiia zmistu osvity [Didactic concept of the content of education]. *Suchasni informatsiini tekhnolohii ta innovatsiini metody navchannia v pidhotovtsi fakhivtsiv: metodolohiia, teoriia, dosvid, problemy: Zbirnyk naukovykh prats*, II, 22–26.

Diachenko, O. F. (2016). Vidbir i strukturuuvannia zmistu matematychnoi osvity bakalavriv iz systemnoho analizu v umovakh realizatsii kompetentnisnoho ta intehratsiinoho pidkhodiv [Selection and structuring of the content of mathematical education for bachelor's degree students in system analysis under the conditions of competency-based and integration approaches]. *Visnyk Zhytomyrskoho derzhavnoho universytetu imeni Ivana Franka. Pedahohichni nauky, 2*, 31–35.

Radkevych, V. O. (2010). Dydaktychni pidkhody do vidboru i strukturuuvannia zmistu profesiino-tekhnichnoi osvity [Didactic approaches to selecting and structuring the content of vocational education]. *Suchasni informatsiini tekhnolohii ta innovatsiini metody navchannia v pidhotovtsi fakhivtsiv: metodolohiia, teoriia, dosvid, problemy, 26*, 72–77.

Radkevych, O. P. (2020). *Teoretychni i metodychni osnovy rozvytku pravovoi kultury pedahohichnykh pratsivnykiv zakladiv profesiinoi osvity: Dys. ... d-ra ped. nauk [Theoretical and methodological foundations for the development of legal culture among teachers of vocational education institutions: Doctoral dissertation]*. Kyiv.

Stepanova, T. (n.d.). Komponenty i chynnyky formuvannia zmistu osvity [Components and factors for forming the content of education]. https://ird.npu.edu.ua/files/stepanova_t.pdf

Androshchuk, I. V. (2017). *Teoretychni i metodychni osnovy pidhotovky maibutnikh uchyteliv trudovoho navchannia ta tekhnolohii do pedahohichnoi vzaiemodii u profesiinii diialnosti: Dys. ... d-ra. ped. nauk [Theoretical and methodological foundations of training future teachers of labor training and technology for pedagogical interaction in professional activities: Doctoral dissertation]*. Kyiv.

Koshuk, O. B. (2019). *Teoretychni i metodychni zasady formuvannia profesiinoi kompetentnosti maibutnikh fakhivtsiv iz ahroinzhenerii: Dys. ... d-ra ped. nauk [Theoretical and methodological foundations for forming the professional competence of future agro-engineering specialists: Doctoral dissertation]*. Kyiv.

Borodienko, O. V. (2018). *Systema rozvytku profesiinoi kompetentnosti kerivnykiv strukturnykh pidrozdiliv pidpryiemstv sfery zv'iazku: Dys. ... dokt. ped. nauk [The system of professional competence development of heads of structural units of enterprises in the communications field: Doctoral dissertation]*. Kyiv.

Bloom, B. S. (1956). *Taxonomy of educational objectives, Handbook I: The cognitive domain*. David McKay Co Inc.

Titova, O. A., Luzan, P. H., Pashchenko, T. M., & Mosiia, I. A., et al. (2023). *Systema rozvytku profesiinoi kompetentnosti pedahohichnykh pratsivnykiv fakhovykh koledzhiv v umovakh pandemii, voiennoho ta povoiannoho chasu: Monohrafiia [System of professional competence development of teaching staff of professional colleges during the pandemic, wartime, and post-war period: Monograph]*. IPO NAPN.

SMART-postanovka tsilei, abo yak zrobyty bud-iake zavdannia zdiisnennym? [SMART-goal setting or how to make any task achievable?]. (n.d.). https://cybershark.pro/uk/smart-postanovka-cilej/

Kalenskyi, A. A., Luzan, P. H., Pashchenko, T. M., & Vanina, N. M. (2018). *Standartyzatsiia profesiinoi osvity: teoriia i praktyka: Monohrafiia [Standardization of professional education: Theory and practice: Monograph]*. Polissia.

Pro fakhovu perevyschu osvitu: Zakon Ukrainy vid 06.06.2019 r. № 2745-VIII [On professional pre-higher education: Law of Ukraine from 06.06.2019 № 2745-VIII]. (2020). https://cutt.ly/eNWF0Wb

Haluziak, V. M., Smetanskyi, M. I., & Shakhov, V. M. (2007). *Pedahohika: navchalnyi posibnyk [Pedagogy: A textbook] (4th ed., revised and supplemented)*. State Cartographic Factory.

Zmist osvity v natsionalnii shkoli [Content of education in the national school]. (n.d.). https://studfile.net/preview/10075197/

Pukhovska, L. P., Vornachev, A. O., & Leu, S. O. (2015). *Profesinyi rozvytok personalu pidpryiemstv u krainakh Yevropeiskoho Soiuzu: Posibnyk [Professional development of personnel of enterprises in the European Union countries: Handbook]* (L. P. Pukhovska, Ed.). IPTO NAPNU.

Zholonko, T. (2020). Orhanizatsiia, shcho navchaietsia: Svitovyi dosvid ta ukrainski realii [Learning organization: Global experience and Ukrainian realities]. *Halytskyi ekonomichnyi visnyk, 66(5),* 162–169.

Hernandez, M. (2001). The impact of the dimensions of the learning organization on the transfer of tacit knowledge process and performance improvement. In Aliaga, O. A. (Ed.), *Academy of human resource development (AHRD) conference proceedings*, (pp. 189–196). Baton Rouge, LA.

Kritsonis, W. A., & Smith, Y. E. (2006). The differences in professional development with corporate companies and public education. *Doctoral forum: National journal for publishing and mentoring doctoral student research, 3*(1), 1–6.

Ilin, V. V., Luzan, P. H., & Rudyuk, Ya. M. (2010). *Metodyka testovoho kontroliu uspishnosti navchannia studentiv: Monohrafiia [Methodology for test control of student learning success: Monograph]*. NAKKiM.

Poroshenko, M. A. (2019). *Inkliuzyvna osvita: Navchalnyi posibnyk [Inclusive education: Textbook]*. TOV "Ahentsvo "Ukraina".

Kozakov, V. A., Artyushyna, M. V., & Kotykova, O. M., et al. (2003). *Psykholohiia diialnosti ta navchalnyi menedzhment [Psychology of activity and educational management]*. KNEU.

Pro vnesennia zmin do Polozhennia pro elektronni osvitni resursy [On amendments to the Regulation on electronic educational resources]. (2019). Order of the Ministry of Education and Science of Ukraine № 749, dated May 29, 2019. https://ips.ligazakon.net/document/view/Re33637?an=41

Luzan, P. H., Sopivnyk, I. V., & Vygovska, S. V. (2016). *Metodolohiia ta orhanizatsiia naukovo-pedahohichnykh doslidzhen: Pidruchnyk [Methodology and organization of scientific-pedagogical research: Textbook]*. TsP "Komprynt".

Amelkin, V. I., Zaionchyk, V. M., Sydorenko, V. K., & Shmelov, V. Ye. (2010). *Tekhnichna tvorchist uchniv [Technical creativity of students]* (V. I. Amelkin, Ed.). Kyiv: Center for Educational Literature.