

# THE MEANS OF ENSURING THE QUALITY OF SPECIALISTS TRAINING IN VOCATIONAL EDUCATION INSTITUTIONS



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**Institute of Vocational Education of NAES of Ukraine**



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The monograph presents the main directions for improvement of the efficiency of specialists' training in vocational education institutions, methodological basics for evaluating the quality of students' training at technical schools and vocational colleges. Some examples of innovative methods application for assessing the quality of students' training at technical schools and vocational colleges are given.

The issue is intended for teaching staff of technical schools and vocational colleges, scientists, developers of state policy in the field of vocational education, specialists of the postgraduate pedagogical education system, managers, employers and post-graduate students, particularly those, who work in the field of international cooperation as well as participate the international educational and scientific projects which include Ukrainian partners..

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# INTRODUCTION

In the conditions of the current global and local challenges for Ukraine, the main task of the vocational education system is to train professionally competent, patriotically minded, versatile specialists who can successfully solve complex problems of modern production, constantly learn, and master the latest technologies. Naturally, the successful implementation of this task determines the need for continuous, purposeful, systematic improvement of the quality of vocational education, modernization of content, methods, forms, teaching aids, and other components of the holistic educational process. In this context, the problems of objective, reliable assessment of the quality of vocational training, the issue of developing valid, reliable methods for diagnosing the results of competence-oriented education are extremely important and relevant.

The substantiation of the main areas of increasing the efficiency of the educational process and assessing the quality of vocational education and training in colleges and technical schools is defined as the goal of the collective monograph "The means of ensuring the quality of specialists training in vocational education institutions". The authors develop the idea that it is possible to increase the quality of training of specialists if, based on the competence concept, the educational process is improved and objective assessment of the students' learning results is ensured. The general hypothesis of the study was formulated as follows: to achieve the competence-oriented goals of the educational process in vocational education institutions, it is necessary to systematically combine the processes of modernization of the content, teaching and learning methods, forms and means with the organization of continuous objective, reliable assessment of the quality of students' vocational education and training.

The first part of the monograph "The main directions of increasing the efficiency of specialists' training in vocational education institutions" consists of the following subsections: "Analysis of regulatory support for professional development of masters of vocational training in the system of methodical work" (author E. Tsarova); "Relevant technologies for

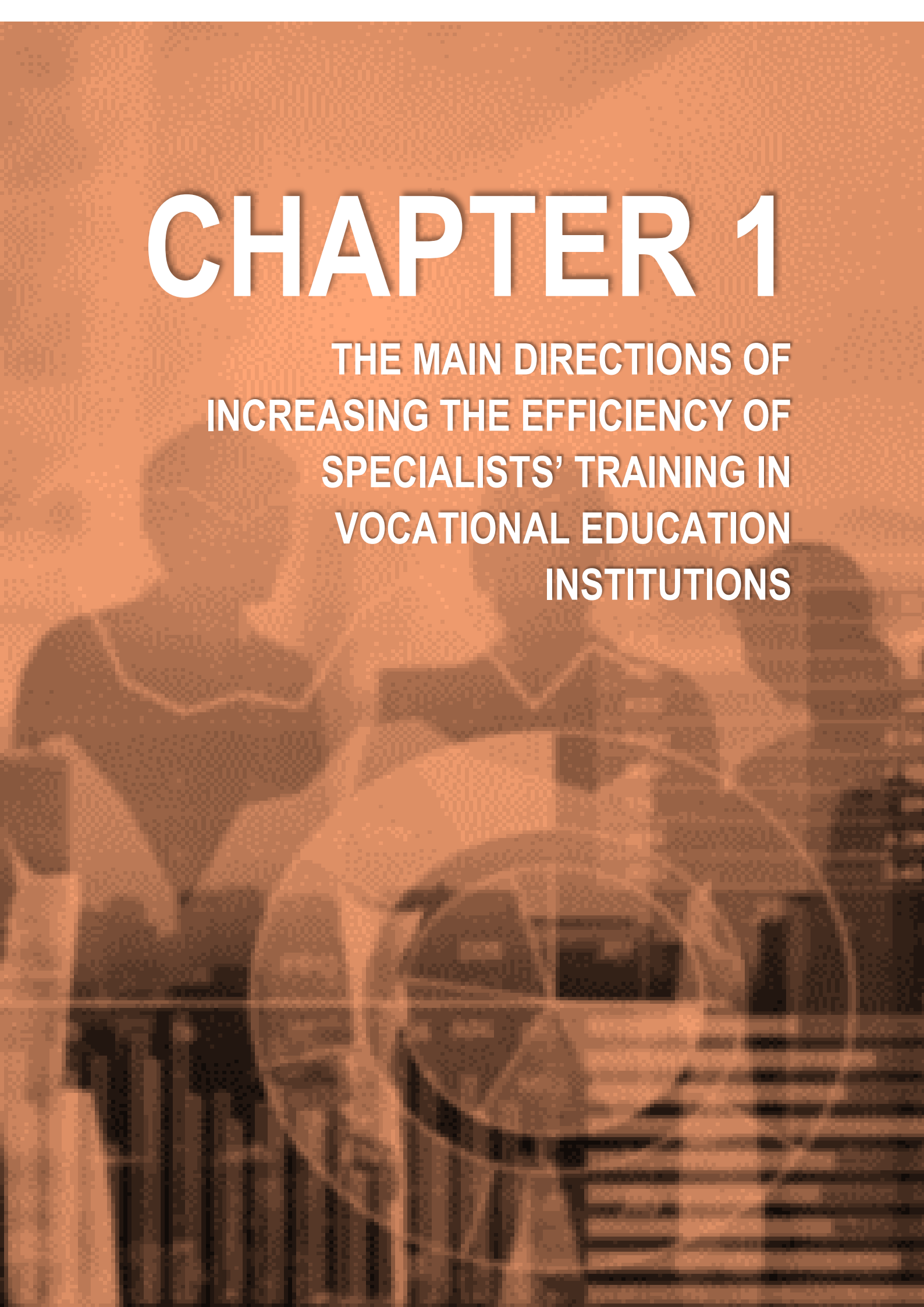
development of teaching staff readiness for the standardization of junior specialists' training" (authors T. Pashchenko, A. Kalenskyi, N. Kalashnik); "Trends in the development of the professional pre-higher education in the modern conditions" (author R. Kurok); "The essence and structure of pedagogical skills of the teacher of general education disciplines of the vocational education institution" (author M. Kabysh); "An individual's cognitive activity problem in history retrospective" (authors I Zaitseva, P. Luzan, T. Pashchenko). In this section, the authors analyzed normative and legal documents regarding the development of vocational education, justified the content-processual aspects of the activation of the student's educational and cognitive activity, highlighted the role of the teachers' professionalism in the purposeful formation of key and professional competencies in students.

The second part of the monograph was devoted to the methodology of evaluating the quality of specialist training in vocational education institutions. It includes the following subsections: "Methodological features of quality assessment of the training of specialists in construction colleges" (authors T. Pashchenko, N. Vanina, A. Ostapenko); "The technique for constructing the tasks for evaluating the learning outcomes of technical college students" (authors P. Luzan, L. Yarosh); "The technique for assessment of the quality of specialists training in institutions of vocational education" (authors P. Luzan, O. Titova); "Approbation of test tasks and analysis of their quality for non-standardized tests" (authors A. Kalenskyi, O. Yamkovyi); "Evaluation of quality of training of specialists in colleges: theory, practice, prospects" (authors A. Kalenskyi, T. Pashchenko, I. Mosia, N. Vanina, N. Kalashnik). The chapter was devoted to the theoretical and practical aspects of evaluating the results of students' learning. Therefore the method of constructing control tasks for evaluating the quality of training of specialists in different fields, the technology of creating tests, the method of determining the validity of diagnostic tools, etc. was highlighted.

The authors hoped that the presented monograph would be of scientific and practical interest to the developers of state policy in the field of vocational and technical and professional higher education both in Ukraine and abroad, managers and teaching staff of vocational education institutions, specialists of the scientific and methodological centers, methodical centers of the Ministry of Education and Science of Ukraine, scientists, post-graduate students, doctoral students, particularly those, who work in the field of international cooperation as well as participate the international educational and scientific projects which include Ukrainian partners.

# CHAPTER 1

THE MAIN DIRECTIONS OF  
INCREASING THE EFFICIENCY OF  
SPECIALISTS' TRAINING IN  
VOCATIONAL EDUCATION  
INSTITUTIONS





## 1.1. ANALYSIS OF REGULATORY SUPPORT FOR PROFESSIONAL DEVELOPMENT OF MASTERS OF VOCATIONAL TRAINING IN THE SYSTEM OF METHODOICAL WORK

### АНАЛІЗ НОРМАТИВНО-ПРАВОВОГО ЗАБЕЗПЕЧЕННЯ ПРОФЕСІЙНОГО РОЗВИТКУ МАЙСТРІВ ВИРОБНИЧОГО НАВЧАННЯ У СИСТЕМІ МЕТОДИЧНОЇ РОБОТИ

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*Relevance: current transformations and challenges of professional (vocational) education (hereinafter “VET”) determine the new requirements for masters of vocational training as the main bearers and developers of skills. This necessitates their continuing professional development. It is the professional development of masters of vocational training that acts as the basis for high-quality training in the VET system. At the same time, effective regulatory support ensures the success of such professional development. The research aims to analyze regulatory documents in the field of education for the requirements for professional development of masters of vocational training.*

*Research methods include the following: theoretical (theoretical analysis of regulatory documents on the problem of professional development of masters of vocational training in the system of methodical work in VET schools); empirical (a study and analysis of regulatory support for professional development of masters of vocational training in the system of methodical work).*

*Results: the publication presents the results from a theoretical analysis of regulatory documents for the requirements for professional development of masters of vocational training.*

*Conclusions: conceptual educational documents regulate the need for professional development of masters of vocational training. They associate professional development with methodical work of teaching staff. Besides, these documents state that professional development covers instructional-methodical, scientific-methodical, organizational-methodical, reference-methodical and other types of methodical work. Professional development of vocational training masters should be one of the strategic priorities of VET schools today and motivate teachers to enhance their professional skills to improve the quality of education.*

*Актуальність: сучасні трансформації професійної (професійно-технічної) освіти (далі – П(ПТ)О) та нові виклики сьогодення детермінують нові вимоги до майстра виробничого навчання як основного транслятора вмінь і навичок для здобувачів професійної освіти, що зумовлює необхідність неперервного професійного розвитку майстрів виробничого навчання закладів П(ПТ)О; професійний розвиток*

майстрів виробничого навчання є основою забезпечення якісної підготовки кадрів у системі професійної (професійно-технічної) освіти; ґрунтова нормативно-правова база є основою успішного професійного розвитку майстрів виробничого навчання у закладах П(ПТ)О.

*Мета:* проаналізувати нормативно-правові документи в освітній сфері на наявність у них вимог щодо професійного розвитку майстрів виробничого навчання.

*Методи:* теоретичні (теоретичний аналіз нормативно-правових документів з проблеми професійного розвитку майстрів виробничого навчання в системі методичної роботи закладів П(ПТ)О); емпіричні (вивчення та аналіз нормативно-правового забезпечення професійного розвитку майстрів виробничого навчання у системі методичної роботи).

*Результати:* здійснено теоретичний аналіз освітніх нормативно-правових документів на наявність у них вимог щодо професійного розвитку майстрів виробничого навчання.

*Висновки:* необхідність професійного розвитку майстрів виробничого навчання регламентується змістом концептуальних освітніх документів, в яких професійний розвиток співвідноситься з методичною роботою педагогічних працівників і включає навчально-методичну, науково-методичну, організаційно-методичну, інформаційно-методичну та інші види методичної роботи; професійний розвиток майстрів виробничого навчання має бути одним із стратегічних пріоритетів сучасного закладу П(ПТ)О і покликаний сприяти професійному розвитку та підвищенню кваліфікації педагогічних працівників з метою підвищення якості освіти.

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**Keywords:** professional development, masters of vocational training, regulatory support, vocational education and training institutions.

**Ключові слова:** професійний розвиток, майстри виробничого навчання, нормативно-правове забезпечення, заклади професійної (професійно-технічної) освіти.

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**Introduction.** Current transformations and challenges of VET determine the new requirements for masters of vocational training as the main bearers and developers of skills. This necessitates their continuing professional development. In turn, conceptual educational documents regulate the need for professional development of masters of vocational training. It is their professional development that acts as the basis for high-quality training in the VET system. At the same time, effective regulatory support ensures the success of these specialists' professional development.

**Sources.** Indeed, it is essential to enhance professional-pedagogical competence of masters of vocational training, given the ongoing updates in the professional training system, the emergence of new production technologies, and the development of the information society. The adoption

of the Law of Ukraine “On Education” as of 2017 has only contributed to the relevance of the problem in question. As stated by paragraph 1 of Article 59 “Professional Development and Advanced Training of Research and Teaching Staff” of this law, “professional development of research and teaching staff covers continuous self-education, participation in professional development programmes and any other types and forms of professional growth. Educational institutions which employ research and teaching staff shall promote their professional development and advanced training”. Therefore, educational institutions are to create appropriate condition for professional development of vocational training masters in the framework of implementing the Law of Ukraine “On Education”. In “The White Book of National Education of Ukraine” (2009), reference has already been made about many teachers’ unwillingness to understand and use pedagogical innovations that largely hampers innovative development of vocational education and training (Kremen, 2009, p. 89).

The mentioned document specifies the main reasons why vocational education and training teachers lack the necessary skills: insufficient awareness of teachers and masters of vocational training about effective innovative methods of conducting theoretical and industrial (practical) classes; low levels of methodical skills; ineffective approaches to managing methodical work of teachers; teachers’ stereotypical attitudes towards theoretical classes and industrial (practical) training. Furthermore, professional training of vocational education and training teachers does not provide for them to be trained for innovative activities. The teachers themselves have only a superficial understanding of pedagogical technologies and fail to use them in the educational process (Kremen, 2009, p. 93).

Many studies prove that teachers can achieve high levels of professional and, especially, methodical, skills, once they have realized the need for professional development, and self-improvement. Also, they should demonstrate a motivational-axiological attitude towards methodical activities and have self-regulation, self-organization, and self-control skills (Shovkun, 2010, p. 134).

Thus, it is essential to find out how professional development of masters of vocational training is related to regulatory documents in the field of education.

**The research aims** to analyze regulatory documents in the field of education for the requirements for professional development of masters of vocational training.

**Research methods** include the following: theoretical (theoretical analysis of regulatory documents on the problem of professional development of vocational training masters in the system of methodical work in vocational education and training institutions); empirical (a study and analysis of regulatory support for professional development of masters of vocational training in the system of methodical work).

**Results and discussion.** Today it is vital to modernize the VET system and improve its management, as stated in several regulatory documents on the main reforms in professional education.

The State National Programme “Education” (“21st Century Ukraine”) declares the priority of teachers’ professional development. Teachers should become the main driving force of the revival and creation of a qualitatively new national education system. Thus, it is important to train a new generation of teachers and reinforce their general culture, professional competence and social status to a level corresponding to their role in society. One of the main ways to do that is to ensure continuous education among teachers, enhance their professionalism, and culture (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 1993).

The Decree of the President of Ukraine “On the National Strategy of Education Development in Ukraine until 2021” (2013) states that “the efforts of education authorities, scientific-methodical services with the support of society and the state should be focused on enforcing strategic areas in education development, overcoming existing problems, fulfilling pressing objectives”. The main objectives of the National Strategy are as follows: a) to improve the system of training, retraining and advanced training of teaching, research and managerial staff of educational institutions and b) to enhance their managerial culture. Therefore, one should improve the system of training, retraining and advanced training of research and teaching staff of VET schools to ensure sustainable development and effective

breakthrough of the national VET system (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2013).

The National Economic Strategy 2030 (Uriadovyi portal, 2021) contains a coordinated vision for the strategic course of Ukraine's economic policy, which considers global trends and the state's capabilities. One of the strategic courses of Ukraine's economic policy is "The Strategic Life Quality Course". They have formulated the objective on the implementation of education content and quality to achieve the first strategic goal of this strategic course ("Creating an Inclusive, Innovative and Educated Society in which Citizens Have Equal Rights and Opportunities to Develop Their Talent throughout Their Lives"). What is important for the research is the fact that one of the ways to achieve strategic goals in the education content and quality section (see "VET Development Chapter") is "to create conditions for professional development of VET teachers".

The main documents that highlight the professional development of masters of vocational training are the Laws of Ukraine "On Education" (2017), "On Professional (Vocational) Education" (1998), "On Professional Development of Employees" (2012). Part 2 of Article 54 of the Law of Ukraine "On Education" (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2017) states that teachers shall constantly improve their professional, cultural and pedagogical skills.

As shown by Article 45 of the Law of Ukraine "On Professional (Vocational) Education" (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 1998), teachers must be certified to ascertain their suitability for their present position and provide proof of their professional abilities. The central executive body determines the frequency of compulsory certification and the procedures foreseen for its exercise. This ensures the formation and implementation of state policy in the field of education and science. The decisions of the certification council act as the basis for assigning to a teaching professional the corresponding category or dismissing him or her in the order provided by the legislation.

According to Part 6 of Article 18 of the Law of Ukraine "On Education" (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2017), advanced training means the acquisition of new and/or enhancement of previously acquired competences as part of professional activities or

expertise. Therefore, any forms and types of professional development chosen by a teaching professional must lead to the acquisition of new and/or enhancement of existing competences (knowledge, skills, abilities).

Article 2 of the Law of Ukraine “On Professional Development of Employees” (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2012) asserts that “state policy in the field of employees’ professional development follows the principles of accessibility of professional development to employees; employer’s free choice of forms and methods of ensuring employees’ professional development under job specifics; observance of employer’s and employee’s interests; continuity of employees’ professional development”.

The procedure for professional development of research and teaching staff, approved by the order of the Cabinet of Ministers of Ukraine “Some Issues of Professional Development of Research and Teaching Staff” (2014) is an important regulatory document that reveals theoretical and methodological principles of professional development for masters of vocational training. The document states that advanced training of teaching staff is “provided by founders of educational institutions (or their authorized bodies), as well as by governing bodies of relevant educational institutions, within the powers and under the law”. At the same time, research and teaching staff are obliged to constantly engage in professional development. The aim of advanced training of research and teaching staff is their professional development following state policy in the field of education and education quality assurance. Research and teaching staff can improve their qualifications in various forms and types. Forms of professional development are institutional (full-time, part-time, distance, dual, in-service, in production) and can be combined. The main types of advanced training are training programmes, including participation in seminars, workshops, webinars; internships (Ministerstvo osvity i nauky Ukrainy, 2014).

The approval of the professional standard “Master of Vocational Training” has played a no less important role in establishing conceptual legal prerequisites for professional development of these specialists (Natsionalna akademiia pedahohichnykh nauk Ukrainy, 2019). According to the background information of the standard, “the main goal of professional activities of vocational training masters is the organization and provision of

professional and practical training (in terms of industrial training and practice)” (Ministerstvo rozvytku ekonomiky, torhivli ta silskoho hospodarstva Ukrainy, 2019).

A detailed analysis of the professional standard shows that Chapter 2 deals with the preparation and professional development of masters of vocational training. Also, the standard includes generic competences of these specialists, including the capacity for self-improvement (Ministerstvo rozvytku ekonomiky, torhivli ta silskoho hospodarstva Ukrainy, 2019). Job functions of masters of vocational training (that are of relevance to this research) involve “professional development”. The latter consists of several professional competences (by one or a group of job actions), knowledge, abilities, and skills:

- the ability to self-reflect and correct one’s professional activities, taking into account the results of professional influence; the knowledge about professionally important personal qualities of vocational training master; abilities and skills in evaluating professionally important personal qualities and results of pedagogical influence critically;

- the ability to develop and implement programmes on professional development; the knowledge about the content of professional development programmes; abilities and skills in developing and implementing professional development programmes;

- the ability to organize workshops, demonstration lessons, training sessions; the knowledge about the requirements for organizing workshops, training sessions, as well as criteria for evaluating demonstration lessons; abilities and skills in organizing workshops, demonstration lessons, training sessions;

- the ability to take measures to preserve physical and mental health, prevent burnout; the knowledge about labour regulations, the length of working hours and rest hours, rules and duties of masters of vocational training, social protection and responsibility, the state of physical and mental health, signs of burnout, its diagnostic and prevention; abilities and skills in distributing workload rationally, preventing fatigue, monitoring physical and mental health, seeking health care (in needed), creating a positive work environment, as well as self-regulation techniques, and resistance to stress (Ministerstvo rozvytku ekonomiky, torhivli ta silskoho

hospodarstva Ukrainy, 2019).

Job functions of vocational training masters in terms of “methodical work” consist of the following professional competences (by one or a group of job actions), knowledge, abilities, and skills:

- the ability to develop teaching aids on industrial training and practice; the knowledge about a) the content and forms of methodical work, b) the content, structure, and requirements for teaching aids, c) the methods, forms and tools to ensure interaction during the educational process, d) goals and objectives of industrial training and practice; abilities and skills in developing teaching aids on industrial training and practice, formulating goals and objectives of industrial training and practice, selecting methods, forms and tools ensure interaction during the educational process;

- the ability to use digital technologies to solve methodical problems; the knowledge about electronic educational resources, sources of digital information, general characteristics of collecting, transmitting, processing and accumulating digital information; abilities and skills in searching, structuring, and assessing the reliability of the information, adapting it to the educational process and didactic requirements;

- the ability to validate and promote innovation; the knowledge about the essence and features of innovative approaches to organizing the educational process, principles of research and teaching activities (types, stages and methods of pedagogical research, pedagogical experiment), forms of presenting and ways of validating the results of innovative activities, stages of preparation and requirements for public speech, publication of articles, abstracts, reports; abilities and skills in implementing innovative approaches to organizing the educational process, determining the practical value of innovations, selecting appropriate forms and methods of presenting innovative results and teaching aids, preparing articles, abstracts, reports;

- the ability to analyze and use positive aspects of teaching practice; the knowledge about current problems and educational trends, criteria for evaluating teaching practice; abilities and skills in analyzing and evaluating teaching practice, predicting its effectiveness, adapting and implementing positive aspects of teaching practice in specific conditions of the educational process (Ministerstvo rozvytku ekonomiky, torhivli ta silskoho



hospodarstva Ukrainy, 2019).

According to the order of the Ministry of Education and Science of Ukraine “On the Approval of Qualification Characteristics of Professions (Positions) of Research and Teaching Staff of Educational Institutions” (2013), “qualification characteristics contain a specific list of job duties of employees, taking into account the peculiarities of labour organization and management, their rights, responsibilities and competencies”. A qualification characteristic of each position consists of three sections, such as “Tasks and Responsibilities”, “Must Know” and “Qualification Requirements”. Besides, these characteristics should reflect a teaching professional’s competences. At the same time, competence means the quality of the employee’s actions that allow him or her to solve professional problems effectively, as well as his or her willingness to take responsibility for his or her actions. The main components of a teacher’s competence are professional, communicative, innovative, and legal (Ministerstvo osvity i nauky Ukrainy, 2010).

The above-mentioned competences necessitate professional development of masters of vocational training. Nowadays, a master of vocational training should a) be familiar with regulatory documents and adhere to the requirements of conceptual educational documents in his or her professional activities, b) build and implement his or her pragmatic trajectory of activities, c) strive for self-development and self-improvement, taking into account the main trends in the development of technologies. Furthermore, a master of vocational training should be able to effectively communicate with employers, engage in long-term and short-term advanced training, as well as non-formal learning, systematically. Finally, a master of vocational training should know how to use digital tools and virtual resources to convey educational and production-related material to students, as well as estimate and correct their learning outcomes.

The Regulation on the Center for Teachers’ Professional Development (2020), approved by the Cabinet of Ministers of Ukraine, highlights the need for professional development of masters of vocational training. The document also introduces the concept of “professional development trajectory”. It is defined as a way of realizing a teacher’s professional potential that is based on his or her free choice of educational

institution, establishment, organization, other actors in educational activities, as well as types, forms, modes of completion of education and educational programmes within the framework of adult education” (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2020).

Professional development also appears in “The Guidelines for Professional Development of Research and Teaching Staff”, approved by order of the Ministry of Education and Science of Ukraine (2020). The document states that professional development should comply with the relevant professional standard (if any) and specific job responsibilities and/or prospects of their expansion”, “personal professional interests of research and teaching staff, available experience, the effectiveness of professional performance”. Furthermore, teachers, with the assistance of the educational institution, are entitled to determine the professional development trajectory and its content (Ministerstvo osvity i nauky Ukrainy, 2020).

The main incentives for professional development are teachers’ attestation and certification. As stated in the Standard Regulations on Attestation of Teachers (2010), approved by the Ministry of Education and Science of Ukraine, they aim to stimulate systematic and continuing development of teachers’ professional competence, professional skills, creative initiative, enhance their prestige and authority, as well as ensure the effectiveness of the educational process (Ministerstvo osvity i nauky Ukrainy, 2010). It must be noted that certification seeks to “identify and motivate highly-qualified teachers with a high level of methodical competence who are familiar with methods of competence-based learning, know how to use new educational technologies and are ready to promote them (Verkhovna Rada Ukrainy. Zakonodavstvo Ukrainy, 2018).

**Conclusions.** A theoretical analysis of regulatory documents shows that conceptual educational documents regulate the need for professional development of masters of vocational training. They associate professional development with methodical work of teaching staff. Besides, these documents state that professional development covers instructional-methodical, scientific-methodical, organizational-methodical, reference-methodical and other types of methodical work. The research proves that professional development of masters of vocational training should be one of

the strategic priorities of VET schools today and motivate teachers to enhance their professional skills to improve the quality of education.

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## 1.2. RELEVANT TECHNOLOGIES FOR DEVELOPMENT OF TEACHING STAFF READINESS FOR THE STANDARDIZATION OF JUNIOR SPECIALISTS' TRAINING

### ТЕХНОЛОГІЇ РОЗВИТКУ ГОТОВНОСТІ ПЕДАГОГІЧНИХ ПРАЦІВНИКІВ ДО СТАНДАРТИЗАЦІЇ ПІДГОТОВКИ МОЛОДШИХ СПЕЦІАЛІСТІВ

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*Relevance: Professional training quality of prospective junior specialists mainly relies on teaching staff competence in professional training standards in colleges and technical schools.*

*Aim: The aim of this research was to determine the ways of implementing educational technologies to develop teaching staff competence in junior specialists' training standards.*

*Methods: A number of theoretical methods were used in this research including the analysis and the synthesis (to identify the current issue research level), summary (to make conclusions and recommendations).*

*Results: The implementation of this type of training system is based on educational methods including structural, logical, integrative, play-based, dialogic and other teaching techniques.*

*The authors briefly mention the educational technologies which are relevantly used to develop teaching staff competence in junior specialists' educational standards including training seminars, discussion seminars (group discussions), brainstorm, polylogues, positional discussions, training games (exercise games), staging (business simulation), complex action games (case-study method), contest games, projects (alternatively called*



“project management”), training, case problem solution, criteria kaleidoscope, talk-show.

*Conclusions: Workshops, trainings, case methods, round tables and other educational technologies help achieve practical results in developing teaching staff competence in junior specialist training standards.*

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*Актуальність: якість професійної підготовки майбутніх молодших спеціалістів значною мірою визначається готовністю педагогічних працівників до стандартизації фахової освіти молодших спеціалістів у коледжах і технікумах.*

*Мета: з'ясувати особливості застосування педагогічних технологій для розвитку готовності педагогічних працівників до стандартизації підготовки молодших спеціалістів.*

*Методи: аналіз і синтез – з метою з'ясування стану та рівня розробленості досліджуваної проблеми; узагальнення*

*– для формулювання висновків і рекомендацій щодо застосування технологій розвитку готовності викладачів до стандартизації підготовки молодших спеціалістів.*

*Результати. Основою реалізації методичної системи розвитку готовності педагогічних працівників до стандартизації підготовки молодших спеціалістів у коледжах і технікумах є застосування педагогічних технологій чи методик, серед яких виділяють: структурно-логічні, інтеграційні, ігрові, діалогові, тренінгові. Коротко охарактеризовані педагогічні технології, які доцільно застосовувати для розвитку готовності педагогічних працівників до стандартизації підготовки молодших спеціалістів: семінар-тренінг, семінар-дискусія (групова дискусія), мозковий штурм (мозкова атака, брейнстормінг), полілог, позиційна дискусія, ігри тренувального характеру (ігри-вправи), ігри-інсценівки (бізнес-симуляція), комплексні дієві ігри (розв'язання кейс-стаді), ігри-змагання, ігрове проектування (управління проектами), тренінг, ситуація-проблема (ситуаційна задача), критеріальний калейдоскоп, ток-шоу.*

*Висновки: досягти реальних результатів розвитку готовності педагогічних працівників до стандартизації підготовки молодших спеціалістів допоможуть технології майстер-клас, тренінги, кейс-метод, «круглі столи» та інші технології навчання.*

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**Keywords:** teaching staff competence; junior specialists' educational standards; educational techniques.

**Ключові слова:** готовність педагогічних працівників, стандартизація підготовки молодших спеціалістів, педагогічні технології.

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**Introduction:** Teaching staff activity in professional education standards is one of the priority vectors of domestic educational system modernization.

The importance of special pre-higher education is based on involvement students into social and cultural professional activity,

development their personality-forming ideals, values, beliefs and attitudes helping young people find own position in the world (Yershova, 2015).

Professional training quality of prospective junior specialists mainly relies on teaching staff competence in professional training standards in colleges and technical schools.

**Sources.** The issue is based on a wide number of aspects and vectors including the ways of training efficient competence in teaching activity (researched by Kolominskyi Y., Lysenko A., Luzan P., Mazukha D., Romanova G., Yaroshenko O.), psychological aspects of teaching competence development (researched by Ball G., Vynogradova M., Gasparyan V., Dorokhina V., Karamushka L., Maztomazyan M., Molyako V., Ravykovych S., Rudyk P. and other scientists).

It is important to point out that the research results offered by these scientists are insufficient to cover the issue of teaching staff competence in junior specialists' education standards.

**The aim of this research** was to determine the ways of implementing educational technologies to develop teaching staff competence in junior specialists' training standards.

**Methods.** A number of theoretical methods were used in this research including the analysis and the synthesis (to identify the current issue research level), summary (to make conclusions and recommendations).

**Results and discussion.** Special pre-higher education standards is expected to guarantee the unity of domestic learning environment, compatibility of basic educational plans, thus taking into consideration the personal abilities of all students. According to the Education Act adopted in Ukraine, one of the most essential conditions of modern quality education is to develop and implement a new generation of higher education standards comprising the rules of key competences of students, results of their learning, the whole education plan and other legally-approved components.

The implementation of competence approach is supported by educational methods and techniques helping students achieve estimated scientific results, enlisted in the educational standards (Luzan, 2018).

The aim of developing teaching staff competence in training standards of prospective junior specialists in colleges and technical schools is to implement motivational, cognitive, pragmatic and personal components

studying the positive sides of educational concepts, ideas and technologies (Kalenskyi, 2019). Teaching staff competence formation process in training standards of junior specialists in colleges and technical schools is supposed to be held both in basic educational establishments, training organizations, and to be closely connected with informal education. Routine educational work is the key factor which favours teaching staff competence in training standards. Responsible approach to education plans, compatible with relevant teaching techniques helps motivate teachers to optimize their theoretical knowledge and practical skills.

Formation of teaching staff competence in junior specialists' training standards mainly relies on favourable educational environment in colleges and technical schools. This type of learning surrounding promotes self-development, helps teachers get familiar with best educational practices and advanced experience, latest know-hows and teaching techniques shared at pedagogical or psychological courses.

Formation of teachers' competences in colleges and technical schools is generally based on three involvement levels:

1. Research-to-practice conferences, educational seminars and councils, webinars.
2. Educational training, creative groups, advanced teaching experience and teaching art schools, seminars etc.
3. Self-education, research on individual educational issue(s) etc.

Teaching staff competence in junior specialists' standards is an integral personal feature which promotes self-discipline, boosts professional activity and helps achieve better performance.

Studying in appropriate educational organizations is expected to include extra training of teachers at seminars and courses with the purpose of optimization and sharing knowledge in junior specialists' training standards.

Informal education comprises lectures, roundtables, practical seminars, workshops and other forms of progressive special training aimed on raising teachers' readiness to professional activity in conditions of standards. Informal education is expected to include self-learning, studying regulatory documents, bibliography and resources such as topical portals,

websites and net groups offering targeted aid to pedagogical employees enquiring information on education standards.

The methodical system of development of teaching staff competence in junior specialists' educational standards in colleges and technical schools mainly relies on learning methods including structural, logical, integration, play-based, dialogic and training techniques.

Learning performance motivation, modern learning environment, implementation of efficient learning methods, eventual self-control, achieving personal goals, active cognition interest, timeframes for learning and other factors prove this is a person-oriented learning technique.

Training workshops, self-learning development methods, contents-planning and academic progress assessment technologies are supposed to be implemented into learning schedule of educational institutions with the purpose of verifying the readiness of teaching staff to educational standards of junior specialists.

Training workshop as an educational technology makes it possible to use various methods and techniques in practice; as a model of gross activity it helps organize and conduct the entire learning process and create comfortable conditions for interaction and cooperation.

Discussion workshop (group discussion) is held as an opportunity for dialogical communication among students. This type of discussion is a possibility for teachers to introduce and share their ideas as far as education standards are concerned, defend their views, rationally reject wrong decisions and offer better solutions to challenges. Personal knowledge and experience gained in process of self-education are essential conditions of building meaningful dialogues. Discussion workshop may also include elements of brainstorm and management decision simulations.

Brainstorm (brainstorming) is an efficient way of idea production used for finding solutions to different challenges. This technology is targeted on common intellectual activity on finding alternative ways to solve problems.

Using brainstorm technology to develop the competence in standards helps:

- establish connections between theoretical knowledge and practical assignments
- activate cognitive education activity

- create perception of information
- train skills to focus attention and exert efforts on solving practical assignments
- rain skills of collective intellectual activity (Strelnikov V., Britchenko I., 2013).

“Aquarium” is an efficient exercise helping activate critical thinking. Participants are divided into two groups: the first group is expected to discuss topics; the second one is expected to supervise the process. Both groups of participants may change roles.

This exercise makes it possible to come to final decisions with regard on other colleagues’ views, to reconsider own ideas after obtaining new information. This strategy is most useful on the way of building efficient interaction and meaningful communication among all participants. This is a reliable tool of teaching participants how to conduct debates.

Problematic/reflexive polylogue unites three or more participants in discussion representing different points of view. This is a reliable method developing teacher’s competence in junior specialists’ training standards introduced by interviews, discussions, conferences, disputes, management games and other forms. In comparison with dialogue, polylogue is a more complicated tool of education, since it has to consider bigger number of factors including personal characteristics of the involved parties. It is mainly used in group studies and person-oriented learning technology.

Positional discussion is an important method developing teacher’s competence in junior specialists’ training standards. It includes active interaction of all parties into finding optimal solutions, helps teachers

replenish the standards database and makes it possible to openly express own ideas and attitudes to the topics under discussion.

This type of discussion in action expects teachers to be divided into three groups developing solution projects to educational challenges of standards. The third group is supposed to complete the synthesis and find the solution(s).

Play-based technologies help determine own activity contents, set goals, plan the stages of cognitive activity, choose topics, control and assess own work. Thus, implementation of play-based technologies helps form adequate motivation to activity, master psychological cognition method,

develop social and communicative skills, activate standards process, aim on creative work.

Activity of all participants is based on creative use of games helping gain the essential amount of knowledge, master habits and train skills.

- Training games which contain problematic issue with definite solution-finding algorithm

- Management games (business simulation) help work out communicative skills in process of role-play

- Complex action games (solutions to case games) which include impromptu elements in action

- Contest games. Contest as a tuition method offers a text with detailed assignment description, to be fulfilled by two or three small groups of participants, ended by comparison of results. The most optimal result is chosen as the solution

- Game projection is conducted as a first stage of business game (imitation model of business project or plan, built during the course of the first stage). The main difference from the business game method is representation of how to imitate or to replay the process of object's creation or optimization (Honcharov, 2005)

- Training process, introduced as a method of making favourable conditions for finding solutions to own psychological problems, forming professional and interpersonal communication competence

- Case task (situational challenge). Participants are expected not only to analyse the current challenge, but to find relevant solution (Honcharov, Kostiukova ta Hubnitska, 2007).

- Criteria kaleidoscope. Participants are given cards depicting different choice criteria based on the current topic. During the following discussion participants are expected to point out the most important criteria and put the cards accordingly on the demonstration board (the more important the criteria are, the closer to the centre the cards are placed). The results are presented afterwards.

- Talk-show. This role game, based on TV talk shows helps participants to present scientific information, summarize the facts, make conclusions, establish self-control, promote self-esteem and reflexion.

So, the abovementioned techniques are based on synthetic-analytic

activity and reflexive problem-solving followed by verbalization of intellectual processes (Bakhanov, 1999).

Implementation of competence-oriented junior specialists' training contents projection builds sufficient capacities for learning projection technology, play-based, coaching and case studies, and their practical usage in process of training junior specialists. It helps establish principles, find relevant approach to working out guidelines, possibly with IT-support throughout the entire course of junior specialists' training.

Workshops, coaching, case study method, round-tables and other educational technologies may help achieve estimated results in developing teaching staff competence in junior specialists' training standards. Workshop technology is as active form of teacher's creative self-realization. It includes transferring experience by the means of both direct and commented demonstration of teaching techniques. A teacher is expected to be a professional mastering own creative pedagogical style and instructional tuition system. During coaching sessions teachers are demonstrated different tests used as sample and algorithm to work out multilevel, valid and reliable students' academic progress assessment tests.

In order to guarantee instructionally correct realization of this educational technology, it is important to keep to the following (Sidorenko, 2002; Sysoyeva, 2011): permanent and stable groups, openness and readiness of all group members to interaction and communication, favourable psychological surrounding, keeping to the rules of teamwork and each period's structure, evaluation of coaching efficiency in terms of general conditions, psychic, creative and intellectual activity of its every participant.

The leading pedagogical experience points out the efficiency of case study technology in process of meeting targets set by development of teaching staff competence in junior specialists' training standards. This type of educational technology belong to the active tuition methods, its idea is to analyse situations, to discuss and to adopt decisions on certain professional issues (Goncharov, Kostyukova ta Gubnitska, 2007). Practical usage of case method helps built capacity of situational analysis, assess alternative decisions, pick up optimal solutions and realize its implementation. Instructional and situational management games imitating professional creative pursuit are a reliable tool of developing skills of working out both

educational and academic progress assessment technologies.

The main task of every teacher is to train students how to turn efforts into activity. This task is greatly favoured by the technology of collective intellectual activity (CIA).

CIA technology is supported by interaction of all participants, connected with common cognitive interest. Positive results of collective pursuit are determined by organizing skills, intellectual abilities and inner motivation of every participant (Artiushina, 2013).

SMART technologies are widely used to develop teaching staff competence in junior specialists' training standards. SMART technologies open access to electronic resources on professional education standards with their theoretical aspects and interactive knowledge testing. The main advantage of SMART technologies is progressive optimization and simple access to making educational contents and single data repository (Lypska, 2018).

Personal component of teaching staff competence in junior specialists' training standards in colleges and technical schools comprises progressive academic support, contents optimization, replenishment and renovation, careful planning own educational activity and creative pursuit. Personal component helps keep to timeframes and deadlines, survey, analyse and summarize own academic results, implement novelty teaching techniques, improve own teaching style and reflexion skills, generate new ideas, choose optimal teaching contents, alter traditional teaching schemes, exercise alternative approach to problem solutions.

This component can be developed by the means of coaching sessions, workshops, implementation of creative problem-solving methods (inversion, empathy, morphological analysis, brainstorm, kaleidoscope of associations), synectics, fantastic ideas analysis and synthesis, heuristic questions and other methods. Workshop "Building teaching staff competence in training standards in colleges and technical schools", discussion workshop "Structure and contents of modern educational standards: new updates", brainstorm "Idea and contents of competence", polylogue "Higher education standards", positional discussion "The main idea of competence-based educational programs", training games "Academic progress assessment tests", staging games, complex action games, contest games "How to pick up relevant



educational content building definite competence in prospective junior specialists?”, play-based projection “Education technology”, training “What prevents implementation of educational standards?” and other events were conducted during the course of the experimental research titled “Methodical bases of junior specialists’ training standards in colleges and technical schools”.

**Conclusions.** The authors of this research have found out that the development of teaching staff competence in junior specialists’ training standards is supposed to be held both in basic educational establishments, training organizations, and to be closely connected with informal education.

A number of teaching techniques including work-shops, trainings, case method, roundtables and other technologies may be helpful in development teaching staff competence in junior specialists’ training standards.

The perspectives of further research in this area are supposed to be based on substantiation of recommendations of usage definite educational technologies developing teaching staff competence in junior specialists’ training standards.

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### 1.3. TRENDS IN THE DEVELOPMENT OF THE PROFESSIONAL PRE-HIGHER EDUCATION IN THE MODERN CONDITIONS

#### ТЕНДЕНЦІЇ РОЗВИТКУ ФАХОВОЇ ПЕРЕДВИЩОЇ ОСВІТИ В СУЧАСНИХ УМОВАХ

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*The relevance of the study is predetermined by the need to define the place of professional pre-higher education in the domestic educational system and the prospects for the development of this newly formed link of professional education.*

*Aim: to outline the main directions of development of professional pre-higher education in the modern conditions of reforming the educational activity in Ukraine.*

*Methods: theoretical analysis of scientific sources – to determine the level of research of the problem; comparison – in order to study scientific approaches to solving the problem.*

*Results: It is proved that today the state of training applicants of professional education does not fully meet the modern needs of the labor market. The main factors that negatively affect the state of training these specialists were identified, namely: the long process of forming the system of professional pre-higher education and structural changes in the activities of the educational institutions of such type; incompleting legislative and legal regulation of this educational level; insufficient funding of the sphere; imperfect mechanism of forming the state order, which does not fully reflect the needs of the labor market; insufficient participation of employers in forming the content of education, solving problems of professional pre-higher education; insufficient personnel potential and imperfect system of professional development and internship of pedagogical staff etc.*

*Conclusions: the scientific research outlines the main directions of developing professional pre-higher education: completing the process of its legal framework forming; standardization of training applicants of the educational and professional degree of “junior bachelor”; consolidating the principles of student-oriented learning in the educational process; expanding the network of institutions with modern training and production infrastructure and forming the single system of professional education, which would combine professional-technical and professional pre-higher education; implementing new decentralized model of management and financing of the sphere; improving the quality of pedagogical staff who train applicants of education on this level.*

*Актуальність дослідження зумовлена необхідністю визначення місця фахової передвищої освіти у вітчизняній освітянській системі та перспектив розвитку цієї новоутвореної ланки професійної освіти.*

*Мета: окреслити основні тенденції розвитку фахової передвищої освіти в умовах реформування освітньої системи України.*

*Методи: теоретичний аналіз наукових джерел – для з'ясування рівня дослідженості проблеми; порівняння – з метою вивчення наукових підходів до розв'язання проблеми.*

*Результати: доведено, що сучасний стан підготовки здобувачів професійної освіти не повною мірою відповідає актуальним потребам ринку праці; виокремлено основні чинники негативного впливу на стан підготовки відповідних фахівців (тривалий процес формування системи фахової передвищої освіти та структурні зміни в діяльності відповідних освітніх закладів; незавершеність законодавчого та відомчого нормативно-правового регулювання даного рівня освіти; недостатнє фінансування галузі; недосконалий механізм формування державного замовлення, що не повною мірою відображає потреби ринку праці; недостатня участь роботодавців у формуванні змісту освіти, розв'язанні проблем фахової передвищої освіти; недостатній кадровий потенціал та недосконалість системи підвищення кваліфікації та стажування педагогічних працівників тощо).*

*Висновки: основними тенденціями розвитку фахової передвищої освіти є: завершення процесу формування нормативно-правової бази; стандартизація підготовки здобувачів за освітньо-професійним ступенем «молодший бакалавр»; закріплення принципів студентоорієнтованого навчання в освітньому процесі; розширення мережі закладів із сучасною навчально-виробничою інфраструктурою та формування єдиної системи професійної освіти, яка б поєднувала професійно-технічну та фахову передвищу освіту; реалізація нової децентралізованої моделі управління та фінансування галузі; вдосконалення якісного складу педагогічних працівників, які здійснюють підготовку здобувачів освіти.*

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*Keywords: professional pre-higher education, trends of development, student-oriented education, pedagogical staff, postgraduate education.*

||| *Keywords: vocational education, sustainable development, dual corporate model, ICT, educational standards, labor market, qualification frameworks.*

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**Introduction.** Reforming the education system of Ukraine is due to the integration aspirations of the country to the European community, as well as the need to improve the level and quality of the educational services, which should increase the competitiveness of graduates in the domestic and international labour markets. The consequence of this is introducing new legislation into educational activities, changing the established approaches to the organization and implementation of the educational process, developing modern standards for training specialists in various fields, introducing new levels and types of education, forms of obtaining it, etc.

It should be noted that the consequences of reforming the educational space involved all the educational institutions of Ukraine, however, it is

likely the sphere of vocational education underwent the most profound changes.

The scientific community considers that the system of the vocational education includes vocational (vocational-technical) training (or vocational pre-higher education) and higher professional education (Luhovyi and Talanova, 2017). At the same time, it should be noted that a person may acquire certain professional competencies at other levels of education.

The two-tier system of the vocational education existed until 2017 when after the adoption of the Law of Ukraine “On Education” the professional pre-higher education was singled out the system of higher education as a separate integral part of the education system in Ukraine. The event gave grounds to assert the expansion of the vocational education system, the formation of its third link, the professional pre-higher education.

**Sources.** Topical issues of functioning and developing the vocational education in Ukraine, training skilled workers for various sectors of the economy were the subject of research of many scientists, including: V. Andrushchenko, S. Honcharenko,

M. Zhurovsky, I. Zyazyun, A. Kalensky, O. Kovalenko, L. Korotkova, V. Kremin, N. Kuzmina, V. Kurok, M. Lazaryev, V. Luhovy, P. Luzan, L. Lukyanova, N. Nychkalo, V. Radkevych, O. Radkevych, L. Pukhovska, S. Sysoyeva and others.

V. Suprun and V. Maksymchuk studied the issues of decentralization and optimization of managing professional (vocational and technical) and professional pre-higher education in the modern socio-economic conditions; organizing the educational process in the institutions of the professional pre-higher education was researched by T. Ravchyna and H. Shemelyuk (2019); introducing the information technologies into the vocational training was investigated by M. Horikhovsky, Y. Zhuravel, Y. Tsykalyuk, I. Tarasyuk; the main directions of the legislative support of the professional pre-higher education were studied by V. Zeleny and others. However, given the short period of time that passed since the professional pre-higher education was singled out into the separate component of the education system, there are still insufficiently studied questions about determining its place in the national educational space, as well as the promising areas for its further development.

**Aim:** is to identify the problem issues of functioning the system of the professional pre-higher education and trends in its development in the current conditions of reforming the education system in Ukraine.

**Methods:** theoretical analysis of scientific sources – to determine the level of research of the problem; comparison – in order to study scientific approaches to solving the problem.

**Results and discussion.** According to Article 16 of the Law of Ukraine “On Education”, “professional higher education is aimed at forming and developing educational qualifications and it confirms the ability of a person to perform typical specialized tasks in the particular field of the professional activity related to performing tasks of the increased complexity and/or limited management functions characterized by some uncertainty of conditions and require applying the provisions and methods of the relevant science field, and ends with the acquisition of the appropriate educational and/or professional qualifications” (Verkhovna Rada of Ukraine. Legislation of Ukraine, 2017).

In the pedagogical science, the concept of “trend” means a priority area in which the development of the particular phenomenon is carried out. Therefore, in the study the main directions of the development of the professional pre-higher education in terms of reforming the educational activities in Ukraine will be analyzed.

One of the trends in the development of the professional pre-higher education at the present stage is completing the process of its legal definition and implementing the new legislation in the educational activities in order to bring the functioning of the professional pre-higher education institutions to the requirements of the national and European educational space.

As it was noted earlier, in accordance with the provisions of the new version of the Law of Ukraine “On Education”, professional pre-higher education was singled out into the independent integral part of the education system. It led to the situation when technical schools and colleges that trained specialists at the educational and qualification level of “junior specialist”, were deprived of the status of higher education institutions of 1st–2nd levels of accreditation.

These steps at the state level have led to some uncertainty among teachers and students of technical schools and colleges as for the prospects

for the further development of this area of education, as the loss of the status of higher education institutions along with the other unsolved problems may significantly reduce the number of the potential applicants and, as a consequence, to the decline of this part in the vocational education.

In order to reform the system of training of junior specialists, bringing it to the requirements of the national and international regulations, solving the current problems and increasing the level of the educational services suggested by technical schools and colleges, as well as complying the norm of the second paragraph of subpoint 2 of paragraph 6 of Chapter XII of the Law of Ukraine “On Education”, the draft Law of Ukraine “On the Professional Pre-Higher Education” was prepared and adopted by the Verkhovna Rada of Ukraine in June 2019.

This law regulates “the procedure, conditions, forms and peculiarities of obtaining professional pre-higher education and regulates public relations arising in the process of realizing the citizen’s constitutional right to education, rights and obligations of individuals and legal entities involved in exercising this right, it also determines the competence of the state bodies and local self-government bodies in the field of the professional pre-higher education”. In addition, it “establishes the basic legal, organizational, financial principles of the professional pre-higher education system, creates the conditions for combining education with production in order to train competitive professionals to meet the needs of the society, labour market and the state” (Verkhovna Rada of Ukraine. Legislation of Ukraine, 2019).

According to the provisions of the law, technical schools and colleges, which previously had the status of higher educational institutions of the 1st and 2nd levels of accreditation, must be reorganized and “professional colleges – institutions of the professional pre-higher education or structural subdivisions of higher education institutions, other legal entities, which conduct educational activities related to obtaining professional pre-higher education, may conduct research and/or creative artistic and/or sports activities, provide the combination of theoretical training with job training” must be organised on their basis (Verkhovna Rada of Ukraine. Legislation of Ukraine, 2019). The other types of institutions of the professional pre-higher education are military colleges for sergeants and vocational colleges with specific training conditions.



Training specialists of the educational degree “professional junior Bachelor” (instead of the current educational level “junior specialist”) able to effectively carry out practical activities in various sectors of the economy and to meet employers’ demands in the domestic and international labour markets must become the main result of the educational activity of institutions of professional pre-higher education. At the same time, the possibility of training professional junior Bachelors by some institutions of the professional (vocational) education is provided, in case of obtaining the appropriate license and compliance with the standards of the professional pre-higher education.

The above mentioned legislative changes make an important step in the process of reforming the professional pre-higher education which will introduce the conceptual framework of the competence approach in the educational activities of vocational colleges. The dominant idea of competence-based learning is to shift the emphasis from the process of obtaining relevant knowledge, skills and abilities in the particular field to achieving specific learning outcomes (competences) that determine the ability of the specialist to effectively perform tasks of the future professional activity. Therefore, one of the trends in the further development of the professional pre-higher education which will achieve the set aim, is improving the quality of the educational services by standardizing students training of the educational and professional degree of “junior Bachelor”.

At the same time, one should agree with the opinion of scientists that at the present stage “standardizing competence education in terms of justification of aims, content, evaluation of competences of students and graduates of vocational education is still carried out at an intuitive level” (Kalens’ky et al., 2018, p. 15). The development of standards of the professional pre-higher education will solve these problems.

Nowadays, in this country standards for training professionals of various specialties at various levels of education, including the professional pre-higher education, are actively developed. The standard of the professional pre-higher education defines the set of requirements for the educational and professional programmes of the professional pre-higher education that are common to all the educational and professional programmes within the certain specialty (Verkhovna Rada of Ukraine.

Legislation of Ukraine, 2019). It determines the content of the educational activities, competences and final learning outcomes that must be achieved by students during training in the specialty within the educational-professional programme.

The standard of the professional pre-higher education defines the following requirements to the educational-professional programme: the list of obligatory general and special competences and results of training students of the professional pre-higher education; requirements for the prior education of persons who can start training under this programme; the amount of ECTS credits required to obtain the professional Bachelor degree in the relevant specialty; forms of certification of students of the professional pre-higher education; requirements for the internal quality providing system; requirements of the professional standards (if any). These provisions are contained in the Guidelines for the development of the standards of the professional pre-higher education approved by the Order of the Ministry of Education and Science of Ukraine of July 13, 2020, No. 918. This normative document also defines the procedure of developing and asserting the standards of the professional pre-higher education, the structure and the recommendations for their developing. It was designed to assist stakeholders in developing standards and unifying approaches to defining the content requirements.

The next direction of developing the professional pre-higher education to ensure the implementation of the competence paradigm, is the humanization of the education. Its essence is in reorienting the educational process from the traditional knowledge based approach consisting in transmitting the necessary knowledge and forming skills within the relevant specialty to the student-centred educational process where the student's personality, educational needs and necessary social skills prevail and they will allow him to effectively carry out the professional activities and successfully socialize in the society.

It should be noted that for the first time at the legislative level the Law of Ukraine "On Professional Pre-higher Education" formulates the concept of the "student-oriented teaching" and defines it as "the approach to the educational process, which includes: encouraging students of the professional pre-higher education to the role of the autonomous and

responsible entities of the educational process; creating the educational environment focused on meeting the needs and interests of students of the professional pre-higher education, including providing opportunities for forming individual educational plan; building the educational process on the basis of mutual respect and partnership of students of the professional higher education and administration, pedagogical (scientific and pedagogical) and other employees of the institution of the professional pre-higher education” (Verkhovna Rada of Ukraine. Legislation of Ukraine, 2019).

Among the main principles of the student-oriented educational activities there are the following: learning as a teacher-student interaction; mutual understanding in the relationship between them (the presence of mutual trust, respect; desire to work together); relying on students’ cognitive activity (expression of their own thoughts; searching for new ideas, solutions; constructing their own understanding of the objective phenomena and processes; acquiring new skills, etc.); expanding student’s autonomy, granting the right to choose; reflective approach of teachers and students to the processes of teaching and learning; teachers’ and students’ mutual satisfaction with the educational process (Ravchyna and Shemelyuk, 2019, p. 201). This will allow students to be active participants in the educational process and independently choose their own educational plan.

Creating the extensive network of institutions based on the currently functioning colleges and technical schools and forming the united system of the professional vocational education, which would combine vocational and professional pre-higher education is an important trend in the further development of the professional pre-higher education.

According to the data of the Strategy for the development of higher education for 2021–2031, as of the beginning of the 2019–2020 academic year, the number of universities, institutes and academies increased compared to the 2014–2015 academic year by 1.4% (to 281 institutions) while the number of technical schools, colleges and vocational schools decreased by 12.7% (338 institutions), and compared to 1991 – by 51.1% (Strategy for the Development of Higher Education for 2021–2031, p. 9). This indicates the continuing trend of increasing the number of higher education institutions and reducing the number of institutions of the professional pre-higher and vocational education. The main reason for this

phenomenon, in the author's opinion, is the low prestige of working professions in the society and the desire of applicants for higher education and their parents to obtain university diploma.

Thus, according to the Ministry of Education and Science of Ukraine in 2019, 14.7% of graduates of basic secondary education in Ukraine chose to study in the system of the vocational (technical) education, 64.8% continued their studies to complete the secondary education in general secondary education institutions (schools) and 19.6% school graduates in the institutions of higher (currently professional pre-higher – the author's note) education (colleges, technical schools) (Strategy for the development of higher education for 2021–2031, p. 9).

Such situation leads to the shortage of skilled workers in the country and oversaturation of the labour market with higher education institutions graduates, who have to hold jobs and perform the functions of specialists, whose training should be carried out by vocational (technical) education institutions, colleges and technical schools. Given the above mentioned, it is important to take appropriate measures to change the correlation towards increasing the share of graduates entering vocational pre-higher education institutions, compared with those who choose to enter higher education institutions.

Therefore, in the author's opinion, there is an urgent need of creating the network of the educational institutions with modern training and production infrastructure, which would unite institutions of the professional pre-higher and vocational education in the unified system of the vocational education and take into account the needs of regional labour markets for skilled workers. At the same time, it is necessary to promote at the state level the need to obtain working specialties and create decent working conditions and payment for vocational education institutions graduates.

Improving the teaching staff quality of the professional pre-higher education institutions is a current trend in the development of this component of education, as one of the main factors influencing the quality of training is the staffing of educational institutions. The effectiveness of the educational process, the implementation of the ideas of the competence approach education, the use of the new teaching and learning technologies directly depends on the personality of the teacher, their professional and other

competences, motivation to teach in the new conditions, awareness of the need for continuous self-development and self-improvement. It is the teacher who creates the favourable atmosphere for learning, awakens students' interest in the cognitive activities, motivates them to acquire competences and future professional activities, helps to meet students' educational needs and forms them as self-sufficient, enterprising and creative personalities.

However, there also exists a negative trend that was observed in the last several years – the transition of qualified teachers from colleges and technical schools to institutions of higher education or other working places. Among the main reasons for this phenomenon are the following: unsatisfactory working conditions, outdated material and technical base, low wages, low authority of the teacher in the society, etc. Therefore, the state policy in the field of the professional pre-higher education should be aimed at raising the interest of teachers of colleges and technical schools in keeping their positions and involving highly qualified professionals by way of creating favourable working conditions for them, ensuring the necessary level of social and legal protection, wages and opportunities for their further professional development.

Many institutions of the professional pre-higher education are characterized by the high level of the scientific and/or practical experience of most teachers and by the insufficient level of their pedagogical skills. For example, in the institutions of the professional pre-higher education, most teachers are qualified professionals with the extensive experience in enterprise or production, but they are not sufficiently aware of the modern approaches to the organization of the educational process or pedagogical interaction with students, colleagues, etc. (Ravchina and Shemelyuk, 2019, p. 205).

For solving this and the other issues related to the development of the professional competences of teachers of the vocational higher education institutions in Ukraine, there is a system of postgraduate education, which is an integral part of the system of continuing adult education.

Researchers see the main tasks of the system of postgraduate education of the scientific and pedagogical employees as follows:

- improvement of the normative-legal provision of the system of postgraduate pedagogical education;

- development of the standards of postgraduate pedagogical education, focused on the modernization of the system of in-service training, advanced training and internships of teachers, research and teaching staff and heads of educational institutions;
- introduction of innovative technologies of pedagogical support and advanced training of pedagogical employees, scientific and pedagogical staff and managers of the education system taking into account modern tendencies of reforming and modernizing the Ukrainian education system;
- promoting the use of the perspective training during in-service training of teachers, research and teaching staff and educational managers in accordance with the requirements of the society and the development of the state (Tolochko, 2019, p. 45).

According to the relevant law, pedagogical staff of the professional pre-higher education institutions must improve their skills annually. At the same time, the total amount of the academic hours for advanced training for five years cannot be less than 120 hours, of which a certain number of hours must be aimed at improving knowledge, skills and practical skills in working with students with special educational needs and adult students. The results of the professional development must be taken into account when attesting teachers and appointing them to the position or making the employment contract (Law of Ukraine, 2019).

Conclusions. The state of training students of the professional education does not fully meet the modern needs of the labour market. Factors that negatively affect the state of training relevant professionals are as follows: the long process of forming the system of the professional pre-higher education and structural changes in the activities of the relevant educational institutions; incomplete legislative and departmental legal regulation of the level of education; insufficient funding for the industry; imperfect mechanism of forming the state order, which does not fully reflect the needs of the labour market; insufficient participation of employers in shaping the content of education, solving the problems of the professional pre-higher education; insufficient personnel potential and imperfection of the system of advanced training and internship of teachers, etc.

At the same time, government agencies, educational institutions and other stakeholders take measures to bring the situation in line with the needs

of the society and the requirements of the domestic and international regulations in the field of education. This concerns, first of all, developing and improving the legal framework for providing educational services in the field of the professional pre-higher education, introducing the competence-based approach to education, standardizing training, involving business entities in the development of educational standards. The positive aspect is that the expert community and scientists are actively involved in the process. However, some of the outlined issues need further solving.

Based on the analyzed state of functioning the system of the professional pre-higher education in the modern conditions, the main trends in the development of this education component can be defined, namely: completion of the process forming its regulatory framework; standardization of training students of the educational and professional degree “junior Bachelor”; consolidation of the principles of student-oriented learning in the educational process; expansion of the network of institutions with modern training and production infrastructure and the formation of the united system of the professional education, which would combine vocational (vocational and technical) and professional pre-higher education; improving the quality of teachers involved in training students. The identified trends do not cover all the prognostic areas of developing the system of the professional pre-higher education, they can be expanded and supplemented in accordance with the implementation of measures to reform this component of education and research in the field of the educational activities.

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## 1.4. THE ESSENCE AND STRUCTURE OF PEDAGOGICAL SKILLS OF THE TEACHER OF GENERAL EDUCATION DISCIPLINES OF THE VOCATIONAL EDUCATION INSTITUTION

### СУТЬ І СТРУКТУРА ПЕДАГОГІЧНОЇ МАЙСТЕРНОСТІ ВИКЛАДАЧА ЗАГАЛЬНООСВІТНІХ ДИСЦИПЛІН ЗАКЛАДУ ПРОФЕСІЙНОЇ ОСВІТИ

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*The relevance of the study is determined by society's demand for advanced pedagogy, which ensures the formation and development of the future teacher as a creative person, competent, responsible, able to carry out professional activities at world standards, ready for continuous professional growth, social and professional mobility.*

*Purpose: to study the essence and structure of pedagogical skills of the teacher of general education disciplines of the vocational education institution.*

*Methods: study of scientific sources – to determine the degree of development of the problem; generalization and systematization – to formulate own views on defining the essence of the concept of "pedagogical skills of the teacher of general education disciplines of vocational education"; structural-component analysis – to identify components of pedagogical skills of teachers of general education disciplines of vocational education.*

*Results: the essence and structure of the pedagogical phenomenon "pedagogical skills of the teacher of general education disciplines of the vocational education institution" are determined.*

*Conclusions: pedagogical skills of the teacher of general education disciplines of vocational education are justified as an integrative complex personality trait based on perfect professional and pedagogical competence, and which provides a high level of self-organization of pedagogical activities through synthesis of knowledge, experience, values and qualities of the teacher and creative solution of professionally oriented tasks of students mastering the system of knowledge in the disciplines of general education for the development of key competencies of future skilled workers; five interdependent components of pedagogical skills of the teacher of general education disciplines of the vocational education institution (motivational-value, cognitive, activity, personal-reflexive, creative) are singled out; the prospects of further substantiation of pedagogical factors and conditions of effective formation of pedagogical skills of the teacher of general educational disciplines of the institution of vocational education are determined.*

*Актуальність дослідження визначається запитом суспільства на випереджальну педагогіку, що забезпечує становлення й розвиток майбутнього педагога як творчої особистості, компетентної, відповідальної, здатної здійснювати*

*професійну діяльність на рівні світових стандартів, готової до постійного професійного зростання, соціальної та професійної мобільності.*

*Мета: дослідження суті і структури педагогічної майстерності викладача загальноосвітніх дисциплін закладу професійної освіти.*

*Методи: вивчення наукових джерел – для з'ясування ступеня розробленості проблеми; узагальнення й систематизації – для формулювання власних поглядів на визначення сутності поняття «педагогічна майстерність викладача загальноосвітніх дисциплін закладу професійної освіти»; структурно-компонентний аналіз – для виокремлення компонентів педагогічної майстерності викладача загальноосвітніх дисциплін закладу професійної освіти.*

*Результати: визначено сутність і структуру педагогічного феномена «педагогічна майстерність викладача загальноосвітніх дисциплін закладу професійної освіти».*

*Висновки: педагогічну майстерність викладача загальноосвітніх дисциплін закладу професійної освіти обґрунтовано як інтегративну комплексну властивість особистості, що ґрунтується на досконалій професійно-педагогічній компетентності, забезпечує високий рівень самоорганізації педагогічної діяльності за рахунок синтезу знань, досвіду, цінностей і якостей педагога та виявляється у творчому розв'язанні професійно спрямованих завдань опанування учнями системою знань з дисциплін загальноосвітньої підготовки задля розвитку ключових компетентностей майбутніх кваліфікованих робітників; виокремлено п'ять взаємозалежних та взаємообумовлених компонентів педагогічної майстерності викладача загальноосвітніх дисциплін закладу професійної освіти (мотиваційно-ціннісний, когнітивний, діяльнісний, особистісно-рефлексивний, креативно-творчий); визначено перспективність подальшого обґрунтування педагогічних факторів та умов ефективного формування педагогічної майстерності викладача загальноосвітніх дисциплін закладу професійної освіти.*

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**Keywords:** professional education, pedagogical skill, professional фтв pedagogical competence, general educational disciplines.

**Ключові слова:** професійна освіта, педагогічна майстерність, професійно-педагогічна компетентність, загальноосвітні дисципліни.

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**Introduction.** The problem of formation of pedagogical skills of the teacher in our pedagogy is investigated rather actively. Pedagogical skills are the high level of professional and pedagogical activity, which achieves the unity of polished skills and abilities to apply psychological and pedagogical theory in practice and the formed personal characteristics of the teacher, which determine the effectiveness of the pedagogical process. Pedagogical skills are manifested primarily in pedagogically appropriate actions and deeds of the teacher, in the refinement of skills of effective organization of educational and cognitive activities of students and the formation of pedagogical communication with all participants in the educational process,

as well as in the skills and abilities of self-improvement of pedagogical abilities and other significant professional and pedagogical properties and qualities. This understanding of the essence of pedagogical skills allows us to understand pedagogical skills as a complex activity and personal phenomenon of the teacher, to reveal, in more detail, its internal structure and correctly determine the ways of its effective formation.

But in modern Ukrainian education, criteria for assessing effectiveness are being formed and new requirements for ways to build pedagogical activities are being developed. Pedagogical activity, like other areas of human activity, is changing. In these changes, modern researchers identify the following trends: teachers strive for self-analysis of activities, processes and results of their activities, increasing the complexity of pedagogical activities and at the same time the formation of creative position of the teacher in professional activities.

**Sources.** The works of many scientists are devoted to the study of the essence of pedagogical skills of the teacher, his/her structure, ways of formation and development. Scientific research on pedagogical skills was carried out by Ukrainian and foreign scientists E. Barbina, S. Goncharenko, M. Golovan, M. Dyachenko, I. Ziaziun, L. Kandybovych, L. Kramushchenko, I. Krivonos, N. Kuzmina, V. Kutsenko, Z. Levchuk, V. Luhovy, P. Luzan, N. Nosovets, N. Ostroverkhova, O. Otych, O. Pekhota, O. Snisarenko, V. Semychenko, A. Subetto, V. Sukhomlynskyi, T. Sushchenko, N. Tarasevich, M. Yarmachenko and others. The founder of the scientific and practical direction of research of pedagogical skills of teachers in the system of secondary and higher education is I. Zyazyun (1997, p. 30), who defines pedagogical skills as "a set of personality traits that provides self-organization of high professional activity on a reflective basis." An important aspect of the problem is the study of the structure of pedagogical skills, which were considered in the works of I. Ziaziun, I. Krivonos, N. Tarasevich, O. Kirichuk, V. Madzigon, V. Oliynyk, N. Kuzmina, A. Shcherbakov and others. I. Andriadi, I. Ziaziun, I. Krivonos, L. Kramushchenko, P. Luzan, A. Markova, N. Tarasevich, N. Telichko, V. Teslyuk, L. Shovkun and others substantiated the general questions of the content, methods and ways of formation and development of pedagogical skills of teachers. However, in our opinion, insufficient attention of scientists

is focused on the study of pedagogical skills of teachers of vocational education institutions.

**The research aims** to study the essence and structure of pedagogical skills of the teacher of general education disciplines of the vocational education institution.

**Methods:** study of scientific sources – to determine the degree of development of the problem; generalization and systematization – to formulate own views on defining the essence of the concept of "pedagogical skills of the teacher of general education disciplines of vocational education"; structural-component analysis – to identify components of pedagogical skills of teachers of general education disciplines of vocational education.

**Results and discussion.** The works of many scientists are devoted to the study of the essence of pedagogical skills of the teacher, his/her structure, ways of formation and development. Thus, I. Ziaziun considers pedagogical skills as "the highest level of pedagogical activity, which is manifested in the fact that in the allotted time the teacher achieves optimal results" (2000). I. Ziaziun approach the disclosure of the essence of pedagogical skills from the standpoint of personal activity approach, in which skills are understood as "a set of personality traits that provides a high level of self-organization of pedagogical activities." Among the most important personality traits of a teacher, scientists include the humanistic orientation of the teacher, his/her professional knowledge, pedagogical abilities and pedagogical techniques.

It is possible to allocate properties of the personality of the teacher promoting productivity of pedagogical activity: politeness, attentiveness, endurance and self-control, flexibility of behavior, humanity, discipline, kindness, honesty, benevolence, initiative, sincerity, consciousness, observation, love to children, responsibility, sensitivity, organization, camaraderie, decency, patriotism, pedagogical erudition, foresight, principledness, independence, self-criticism, justice, intelligence, courage, desire for self-improvement, tact, sense of the new, self-esteem, etc. There is an opinion that the content of the concept of "pedagogical skills" should include professional skills, which are the defining elements of pedagogical skills, giving the teacher's actions depth, thoroughness, meaningfulness (Ziaziun, 1997; Ostroverkhova, 2006). In the professiogram presented by V.

Slastenin there are about 107 such skills (the ability to put forward problems; the ability to find original solutions; the ability to anticipate; etc.). Well-known Ukrainian scientist, organizer of education, teacher, philosopher I. Ziaziun notes in the "Encyclopedia of Education":

"You can be a professionally competent teacher, i. e. free to navigate in the subject area, systematically perceive and act in pedagogical reality... have modern pedagogical technologies, but not be a master, you can remain a good craftsman. To be a master, you need to have personal professional uniqueness, your style of work, the concept of professional thinking... Therefore, a true master-teacher has his own author system, his school, his followers. (Ziaziun, 2008, p.642).

The outstanding Ukrainian pedagogue V. Sukhomlynskyi in the book "Pavlyska Secondary School" gives a consonant description of the master-teacher to I. Zyazyun:

"What does a good teacher mean? This is, first of all, a person who loves children, finds joy in communicating with them, believes that every child can become a good person ... knows the soul of a child ... A good teacher is, secondly, a person who knows well the science on which the subject he teaches is based, who is in love with this science, knows its horizon – the latest discoveries, research, achievements ... A good teacher is, thirdly, a person who knows psychology and pedagogy, understands and feels that it is impossible to work with children without knowledge of the science of education. A good teacher is, fourthly, a person who has perfect skills in one or another work activity, a master of his craft. (Sukhomlynskyi, 1977, p.49-50).

Thus, the master-teacher reveals the highest forms of activity in professional activities, creative initiative, which is revealed in the appropriate use of methods and means of pedagogical interaction in each specific situation of teaching and education (Telychko, 2014, p. 7). When clarifying the definition of "teacher of general education disciplines", we will be guided by the specified definition of qualities-characteristics of the teacher-master.

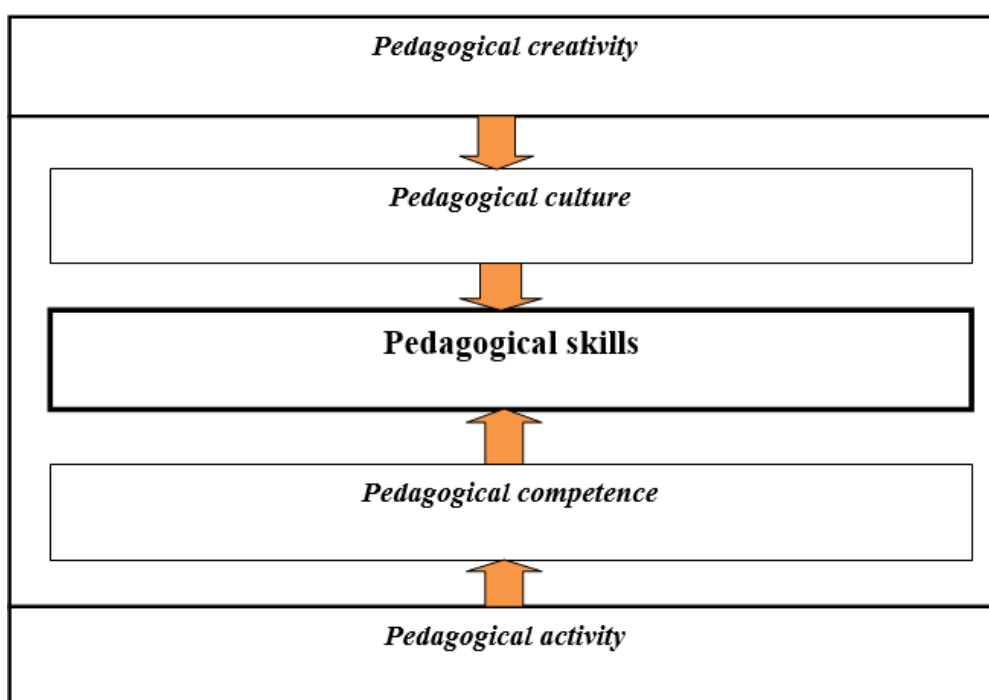
Let's move on to the definition of pedagogical skills. The essence of this phenomenon is expressed, as I. Ziaziun (1997, p. 29) convinces, in the personality of the teacher, his position, ability to show creative initiative on

the basis of own system of values. Examining the processes of formation of the future teacher-master N. Telychko (2014) rightly notes that pedagogical skills are manifested in the activity, but not reduced to it, are not limited to a high level of development of special generalized skills. The skills of the teacher can also be seen as a manifestation of the highest form of activity of the teacher (in professional activities, in his positions, the ability to show creative initiative based on the implementation of own value system, in activities based on humanism and revealed in the appropriate use of methods and means of pedagogical interaction in each specific situation of learning and education) (Otych, 2014, p. 7).

After analyzing various definitions of the studied concept, following scientists (Ziaziun, 1997; Otych, 2014; Semychenko, 2004; Telychko, 2014) we come to the conclusion that:

- scholars consider this phenomenon from the standpoint of personal (complex personality traits of the teacher), procedural (manifestation of activity, creative initiative, reflection), effective (comprehensive solution of problems of teaching, education, student development, the highest level of pedagogical activity, the maximum possible – under certain conditions – the result of solving (pedagogical tasks) approaches;
- this category is a complex semantic structure, and therefore can not be defined by a single definition, and receives a comprehensive description in a set of definitions and interpretations;
- in order to consider in detail the semantic characteristics-formations of the studied phenomenon, it is advisable to define the accompanying concepts that scientists use in one way or another in defining the phenomenon, such as "pedagogical activity", "pedagogical culture", "pedagogical competence", "pedagogical creativity".

The analysis of existing psychological and pedagogical works on the content, essence of the just mentioned categories for further conceptual separation, content and formulation of the main definition of our study allows to model the relationship between the characterized pedagogical categories as follows (Figure 1.1).



*Note. Created by the author.*

*Figure 1.1. Schematic representation of the links between concepts related to pedagogical skills.*

The ideal construct proposed in Fig. 1 reflects our ideas about the interaction of these phenomena and characterizes their conceptual essence with the following provisions:

- pedagogical activity of the teacher of general education subjects is a creative activity, but "pedagogical creativity of the teacher" is a broader (according to S. Sysoeva) concept, as it includes "creative educational and cognitive activity of the student" (Encyclopedia of Education, 2008, p. 650), so these interconnected elements are presented separately in the diagram;

- since pedagogical skills are the highest level of pedagogical activity, based on the professional competence of the teacher, which, in turn, is a systemic ability to perform professional activities, the relationships of this triad show the essence of the studied personality trait from the standpoint of effective approach;

- pedagogical culture of the teacher has creative origins and is a necessary concept of organizing pedagogical influences by the master professional (Ziaziun, 1997), under the conditions of a synthesis of professional (humanistic orientation, desire for self-improvement, ability to organize self-education, etc.), universal (good health, intellectual



development, speech), moral (moral purity, sensitivity, humanity, honesty and truthfulness, etc.) qualities with his pedagogical competence.

Therefore, having determined the essence of pedagogical skills in general, we will try to define the concept of "pedagogical skills of the teacher of general disciplines of vocational education". Focusing on the just analyzed definitions, we first determine the closest generic feature of the studied concept. The results of the above analysis show that scientists define the most common generic features of the concept of "pedagogical skills" a set of properties, ability, individual potential, activity, resource, synthesis of knowledge, experience and personality, level of teaching, integrative system, etc.

Focusing on the definition of pedagogical skills by I. Ziaziun, using the logic of imitation of terms, the closest generic feature (genus proximum) we choose the integrative complex property of the individual (integrative – refers to integration, unification); complex – which covers a group of objects, phenomena, actions, properties; which is a complex of something (Great Explanatory Dictionary of the modern Ukrainian language, 2009).

The next stage of defining the concept is related to finding the species' difference (*differentia specifica*) of the defined concept. Bearing in mind that the definition should include all the most essential features that distinguish it from other generic concepts. To do this, we use the specific features of the pedagogical activities of the teacher of general education disciplines of vocational education. Teachers of general education subjects provide students with a complete secondary education. The teaching of social sciences, humanities, natural sciences and mathematics is held in parallel with the students' mastery of the disciplines of professional-theoretical and professional-practical training. The point is that all types of training of future skilled workers must be systematically combined. And such a combination is provided through compliance with the requirements of the principle of professional orientation. The structure of professional and pedagogical activity of the teacher combines pedagogical and professional (production and technological) components into a single personal construct, which allows for purposeful education and development of students, and the formation of their professional competence, students' qualifications.

Teachers of general education subjects by means of pedagogical integration, through the use of inter-disciplinary links provide professional orientation of teaching general education subjects, form orientations on future professional activity, develop needs and motives of students for mastering the profession, and accordingly, the teacher of general education must at a certain level have the basics of future professional activities of students, use professional information in the formation of students' knowledge system in the discipline. Thus, the first essential feature of the concept is the creative solution of professionally oriented tasks of mastering the system of knowledge by students in the discipline of general education.

In the theory of I. Ziaziun (1997) it is determined that the basis of pedagogical skills is professional competence – knowledge of the subject, methods of its teaching, psychology and pedagogy. The professional competence of the teacher of general education disciplines (professional and pedagogical competence – M. K.) is formed in the course of mastering the educational program, and this process ends with the assignment of the professional qualification to the graduate. This shows that even in the conditions of university education, future teachers have elements of pedagogical skills, and the level of formation of professional and pedagogical competence of the graduate depends on the "speed of acquiring pedagogical skills" (Encyclopedia of Education, 2008, p. 643). The point is that, probably, those graduates who demonstrate high levels of professional and pedagogical competence have the opportunity to become professional masters. Thus, the definition of the studied concept should introduce the sign of "perfect pedagogical competence".

The results of the analysis of existing research (Ziaziun, 1997; Krasnytska, 2020; Otych, 2014; Semychenko, 2004; Telychko, 2014), devoted to aspects of teachers' pedagogical skills, show that scientists unanimously recognize that the master-teacher has a high level of self-organization of pedagogical activity. This characteristic must also be recognized as an essential feature of the pedagogical skills of the teacher of general education disciplines.

The characteristic of the teacher's pedagogical skills – self-organization of his activity – is based, in our opinion, on the synthesis of such components as knowledge, experience, pedagogical qualities. We mean

that, knowledge and qualities of the teacher are synthesized, developed in parallel with such characteristics as pedagogical abilities, pedagogical technique.

As noted above, the pedagogical activity of the teacher of general education subjects is functionally different from the teaching of subjects of general professional or professional-theoretical training. The point is that in addition to forming a system of knowledge in a particular discipline, these teachers must take care of the development of key competencies of future skilled workers, which are manifested through certain abilities (responsible for professional activities; work in a team; make decisions independently; act in unusual situations; plan work activities; adhere to professional ethics; prevent conflict situations). These abilities, in our opinion, should be in the field of view of all pedagogical staff of vocational education institutions, and, above all, teachers of general education disciplines.

Thus, "pedagogical skills of the teacher of general disciplines of vocational education" is an integrative complex property of the individual, based on perfect professional and pedagogical competence, provides a high level of self-organization of pedagogical activities through synthesis of knowledge, experience, values and qualities of the teacher and is manifested in the creative solution of professionally oriented tasks of students mastering the system of knowledge in the discipline of general education for the development of key competencies of future skilled workers.

Due to the purposeful formation and diagnostics of levels of development of pedagogical skills it is necessary to be defined with structure of this integrative complex property of the person. In Table.1.1 we present the most typical approaches of scientists to the selection of structural components of pedagogical skills.

According to the results of the analysis of existing scientific works and own scientific research we distinguish the following content components: professional competence, pedagogical skills, humanistic orientation, pedagogical abilities, pedagogical technique, professional knowledge, psychological and pedagogical knowledge, pedagogical creativity, professionally important qualities, pedagogical culture, creative experience,

Table 1.1  
The structure of pedagogical skills in the research of scientists

No	Author, source	Structural components
1	I.A. Ziaziun (1997)	Humanistic orientation, professional and pedagogical competence, pedagogical abilities, pedagogical technique
2	N.V. Kuzmina, N.V.Kukhareva (1976)	Gnostic (related to the field of knowledge of the teacher); design (outlines the goals of training and education, as well as strategies and means to achieve them); constructive (reflects the teacher's ability to construct own activities and the activities of students); communicative (characterizes the specifics of interpersonal relationships between teachers and students); organizational (related to the ability to organize the activities of students and their own activities) components
3	O.V.Krasnytska (2020)	Professional knowledge; pedagogical skills; professionally important qualities; pedagogical culture; pedagogical technique
4	V.I. Kovalchuk (2011)	High general culture; humanistic orientation; professional knowledge and skills; creativity and pedagogical abilities
5	E.V. Bondarevskaya (1999)	The humanistic position of the teacher in relation to the subjects of the educational process, the ability to be an educator; psychological and pedagogical competence and developed pedagogical thinking; awareness of the subject taught and mastery of pedagogical technologies; experience of creative pedagogical activity; ability to justify one's own pedagogical system (didactic, methodical, educational); ability to develop an author's educational project; culture of professional behavior; ways of self-development; ability to self-regulate own activities; communication
7	N.V. Telychko (2014)	Deontological, axio-acmeological-motivational, personal-developmental, practical-technological, cognitive, communicative components
8	N.N.Tarasevich (1985)	Ability to make learning material available; creativity in work; pedagogical and volitional influence; ability to organize a team; curiosity and love; content and brightness of language (its imagery and persuasiveness); pedagogical tact; ability to combine the subject with life; observation, pedagogical courage. The scientist includes: organization, efficiency, curiosity, self-control, activity, persistence, concentration and distribution of attention into the accompanying individual personality traits of the teacher.

pedagogical tact, pedagogical communication, ethics, pedagogical morality, external culture, speech culture, pedagogical interaction, professional motivation, creative thinking, pedagogical experiment, interpersonal competence, ability to teach the educational material, ability to develop students' interests, organizational skills, ability to predict results of their work, pedagogical observation, pedagogical imagination, demanding, simplicity, clarity and persuasiveness of language, the ability to communicate, to teach educational material clearly, to argue, to lead the discussion, abilities (scientific-cognitive, didactic, perceptual, suggestive and expressive), observation, emotional stability, creativity, personal dynamism, communication, high art of teaching and education, activity, pedagogical and volitional influence, love for students, content and brightness of language (its imagery and persuasiveness), ability to combine the subject with life, pedagogical courage, pedagogical optimism, pedagogical improvisation, efficiency, self-control, curiosity, persistence, concentration and distribution of attention, diversity of interests, desire for professional self-improvement, mastery of innovative pedagogical technologies, self-teaching, pedagogical erudition, pedagogical thinking, creative search, individual style of activity, author's handwriting, ability to teach Z-generation students, digital culture, etc.

Based on the analysis of the above semantic characteristics, it is proposed to consider the pedagogical skills of the teacher of general disciplines of the vocational education institution as a unity of five interdependent components.

***Motivational and value component*** provides high levels of development of moral and ethical values and personal values of the teacher (morality, patriotism, civic and family values, natural consciousness, etc.), positive motives, aspirations to innovative pedagogical activity, sustainable needs of professional self-development, self-realization, purposeful development of creative abilities of students; based on the principles of motivation of achievements, this component is designed to stimulate the development of creative potential of the subjects of pedagogical interaction – both teachers and future skilled workers.

***The cognitive component*** presents a system of knowledge in a particular discipline (or disciplines) of general education (pedagogy,

methodology, psychology, basics of future professional activity of students); ability to productively, creatively solve atypical pedagogical situations on the basis of developed pedagogical abilities (didactic, perceptual, expressive, communicative, etc.), which involves the teacher's ability to use own intellectual potential to design effective methods and technologies, to acquire knowledge and organize productive self-education of students independently. In addition, this component includes the teacher's knowledge of the content of key competencies as the goal of complete general secondary education. In the structure of pedagogical skills of the teacher of general education disciplines, this component performs an instrumental function.

***The activity component*** provides creative realization of the teacher's functions (educational, developmental, informative, illustrative, sense-forming, diagnostic, differential, stimulating, prognostic, culturological, psychotherapeutic, recreational) (Semychenko, 2004) thanks to the perfect professional and pedagogical competence, developed methods of mastering the teacher's physical, mental, emotional state; voice, facial expressions, pantomime, as well as techniques and methods of influencing others through nonverbal and verbal means. In the structure of pedagogical skills of the teacher of general education disciplines, the activity component performs a technological function.

***The personality-reflexive component*** takes into account the general requirements for the personality of the pedagogical worker of the vocational education institution (Otych, 2014) and is an interconnected set of such characteristics: emotional and volitional qualities – proper self-control, persistence, ability to reflect in teaching; high self-demand, self-confidence, patience, emotionality, emotional sensitivity, emotional stability, etc.; communicative qualities

– the ability to engage in dialogic interaction, to establish contact with people, to listen to the interlocutor and take into account his opinion, to create a favorable psychological microclimate, to predict the results of psychological impact on students, observation, etc.; organizational qualities – the ability to manage a group of people, to provoke and develop their activity, to exercise individual influence in group communication; ability to plan work, to distribute tasks and check their performance; moral qualities – humanism, respect for others, tolerance, tact, delicacy, sensitivity,

kindness, tolerance, honesty, decency, obligation, responsibility, justice, sense of humor, etc. (Yershova, 2015); ability to determine the reserves of the further career and personal growth; ability to regulate the activities.

**Creative component** provides a developed ability of the teacher to creative search, non-standard solution of pedagogical problems, which is expressed by such parameters as originality of conclusions, flexibility of thought, curiosity, skills of transposition, openness, interest in everything new, ability to generate paradoxical, unexpected decisions (search for new methods and technologies of teaching and educating the students), the ability to make decisions in situations of uncertainty, not to be afraid of own conclusions and bring them to an end, risking their professional careers and reputations; search-transforming style of thinking; creative imagination, developed imagination; problematic vision of the situation; the ability to immerse oneself deeply in attractive activities; desire for inventions, creativity; interest in mysteries, paradoxes, improvisation. In the structure of pedagogical skills of the teacher of general education disciplines, the creative component performs a creative function.

**Conclusions.** The study substantiates the attributive-relational definition of pedagogical skills of the teacher of general disciplines of vocational education as an integrative complex personality trait based on perfect professional and pedagogical competence, provides a high level of self-organization of pedagogical activities through synthesis of knowledge, experience, values and qualities of the teacher and is manifested in the creative solution of professionally oriented tasks of mastering of the system of knowledge by students in the disciplines of general education for the development of key competencies of future skilled workers. There are five interdependent components of pedagogical skills of the teacher of general education disciplines of the vocational education institution (motivational-value, cognitive, activity, personal-reflexive, creative-creative). The prospects of further substantiation of pedagogical factors and conditions of effective formation of pedagogical skills of the teacher of general educational disciplines of the institution of professional education are determined.

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## 1.5. AN INDIVIDUAL'S COGNITIVE ACTIVITY PROBLEM IN HISTORY RETROSPECTIVE

### ПРОБЛЕМА ПІЗНАВАЛЬНОЇ АКТИВНОСТІ ОСОБИСТОСТІ В ІСТОРИЧНІЙ РЕТРОСПЕКТИВІ

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*The research studies the aspects of cognitive activity and the activity in history retrospection.*

*The cognition and its study is not something unchanged, once and for all given, but is something that develops under certain laws. It has long history with the sources in the most ancient philosophy. At every stage of its development the knowledge is the result of the history of knowledge, the essence of all human activity forms.*

*Scientific knowledge has its historically altered morphology. Its historical path analysis makes it possible to argue its origin from ancient philosophical schools, philosophers of Ancient India, China, Egypt, the countries of Mesopotamia.*

*The phenomenon of an individual's cognitive activity is complex and multifaceted. Scientists argue that cognitive activity is a complicated process of transition from ignorance to knowledge, from inability to ability, from random observations to systematic knowledge of the material world, to mastering the scientific truths. At the same time, a man, mastering new knowledge, affects the world, which, in turn, changes human life.*

*The research analyses the influence of historical conditions on developing scientific thought about cognition, cognitive activity.*

*The effectiveness of studying students' educational and cognitive activity depends on how thoroughly the cognitive process is studied and the way its laws and features are used. The authors emphasise that taking into account the cognition theory possibilities, its Klondike was set in the Ancient world era and filled with new content rising to a new level in each generation, allows predicting the problem studying vector and put forward the hypothetical predictions of its solution.*

*У статті досліджуються аспекти пізнавальної діяльності, активності в історичній ретроспективі. Пізнання і його вивчення не є незмінним, раз і назавжди даним, а являє собою щось, що розвивається за визначеними законами. Воно має довгу історію, джерела якої ведуть у найдревнішу філософію. На кожному етапі свого розвитку знання – це підсумок історії пізнання, сутність всіх форм людської діяльності. Наукове пізнання має свою історично змінювану морфологію. Аналіз історичного шляху цієї науки дає можливість стверджувати, що її витоки беруть свій початок від стародавніх філософських шкіл, філософів Стародавньої Індії, Китаю, Єгипту, країн Месопотамії. Феномен пізнавальної активності особистості є складним і багатоаспектним. Учені стверджують, що пізнавальна діяльність являє собою складний процес переходу від незнання до знання, від невміння до вміння, від випадкових спостережень до систематизованого пізнання матеріального світу, до оволодіння науковими істинами. При цьому людина, опановуючи нові знання, впливає на світ, який, у свою чергу, змінює людське життя. У статті проведений аналіз впливу історичних умов на розвиток наукової думки про пізнання, пізнавальну активність. Результативність вивчення навчально-пізнавальної активності студентів залежить від того, наскільки ґрунтовно досліджено пізнавальний процес, як використовуються його закономірності й особливості. Автором акцентовано, що врахування можливостей теорії пізнання, невичерпні джерела якої започатковуються ще в епоху античності, наповнюються новим змістом та підносяться на новий рівень кожним поколінням, що дає змогу спрогнозувати напрям дослідження проблеми і висунути гіпотетичні передбачення її вирішення.*

**Keywords:** *cognition, an individual's cognitive activity, cognitive action.*

**Ключові слова:** *пізнання, пізнавальна активність, пізнавальна діяльність.*

**Introduction.** Against the background of scientific-and-technological advance, when the subjective facilitation's role for building up our society is noticeably increasing, the problem of a person's activity formation is one of the most actual in pedagogical theory and practice of higher educational institutions. After all, an individual's purposeful conscious activity changes the environment, affecting economic, political, inner features of the society development. These processes determine a person's activity in learning, as his/her cognitive activity formation correlates to autonomy, initiative, integrity, willpower and other human traits development. Thus, while

training a specialist in tax matters not only professional knowledge and skills shaping should be provided but also building up a true citizen of an independent Ukrainian state developing, shaping his/her cognitive needs and inducements for further independent knowledge acquisition and skills upgrading should be ensured.

**Research aim** is to study the aspects of cognitive activity in history retrospective.

**Materials and methods.** To achieve the aim and solve research tasks the appropriate, to the authors' opinion, methods are used. They are theoretical – psycho-pedagogic literature analysis to define the state-of-arts of the problem in pedagogy theory and practice; analysis, synthesis, abstracting, compilation for studying the cognitive action aspects, and its activity in the history retrospective. The researchers' works analysis proclaims the introduction of terms "knowledge", "cognitive strength", "cognitive activity" in pedagogical science while studying the phenomena of learning, training, training activities. The researchers of didactics problems, assuming that the learning process is the highest form of human activity, aimed at identifying new patterns nature and society movement, new knowledge on nature and social phenomena establishing, showed that in the training process the digestion of prior-gained knowledge about nature, society takes place. In this regard, new terms "cognitive activity" and "training activity" were introduced.

**Results and discussions.** It should be noted that the content of students' cognitive activity cannot be compared with the content of a scientist's cognitive activity. Therefore, on the one hand, to define the concepts of "cognitive activity" and "training activity", and on the other – to show their dialectical relationship we accept the concept of "training-and-cognitive activity" in the following study. Scientific studies are becoming more complex, more diverse, and their impact cannot depend on cognitive process thoroughness, its common factors and features use. "Guiding knowledge to yourself" inevitably extends epistemology and gnosiology possibilities.

Scientific knowledge has its historically altered morphology. Its science's historical path analysis makes it possible to argue that its origins come from ancient philosophical schools, philosophers of Ancient India,

China, Egypt, the countries of Mesopotamia. Understanding the world knowledge and ideas development is especially native to the epic of antiquity. In those times philosophers' doctrines (Heraclius Ephesus, Democrat, Confucius, Socrates, Plato, Aristotle) the orienting ideas for researchers in the most difficult life manifestations for following centuries were embraced. These manifestations – feelings, memory and imagination images, associations, passion and individual differences between people (temperament) – were deduced from the action of external objects on the organic body and from the material processes – in the middle of it.

Of particular importance was Aristotle theory. It combined determinism with systematicity principles and psychological knowledge categories. The approach, nowadays called systematic, determined the structure a great Greek's thinking. In his theory the determinism, systematicity and development are indivisible. So, despite the fact that the problem of cognitive activity in the ancient philosophers is not thoroughly covered, yet there are very interesting thoughts about its role in cognition in some scholars' works.

In the Middle Ages education the science was scholastic in nature and separated from life. Only in the Renaissance era, when new philosophical schools were formed, "a person became the first principle of being" (Galuzinskyi, 1995, p. 7), the humanitarian education began to develop rapidly. The bright representative of the humanists was Yan Amos Komenskyi. Based on his sensualist epistemology, he considered the main task of a teacher to develop a student's senses, speech and primary hands-on skills. At the same time, Komenskyi paid great attention to the disclosure of causative relationship between the surrounding world phenomena and taught the students to analyze them. In "Great didactics" he noted that a person should be a wise creature; she has "... to explore everything and name and count everything or know and be able to name and understand everything that exists in the world ..." (Komenskyi, 1982, p. 283).

An outstanding scientist, philosopher, founder of the New times experimental science was the Englishman Francis Bacon, who proclaimed the purpose and essence of studying of the laws of nature, understanding independent isolated things and their properties. Human knowledge, according to Bacon, is capable to reveal the secrets of nature and master it in

that way. He was able to study the cognitive ability, its possibilities, proclaiming the experience as the only source of human knowledge. It is Bacon, studying the problems of cognitive activity, drew the attention to the subjective moments of knowledge and even tried to classify them.

Bacon's follower, the English philosopher-materialist John Locke, developed the doctrine on experience-based knowledge origin. Locke, like other empirical philosophers, considered the activity of thinking limited. In this regard, the cognition method, developed by them, turned into a combination of methods for building a complex to a simple.

A similar approach to Bacon's and Locke's views is found in the theories of the French materialists Y. Lametry, D. Diderot, K. Helvetius, P. Gelbach. But among the materialists there were also rationalists who, in terms of developing the problem of cognitive activity, interpreted cognition as a reality reflection in human consciousness; while appreciating the role of sensory experience. Explaining the cognition as a process that does not require a qualitative transformation of the source data, the rationalists did not consider the cognitive activity as a problem.

The impact to knowledge theory was made by idealist philosophers of the late XVIII and early XIX centuries. Kant, Fitch, Schelling, and Hegel opposed the old materialism, holding that against underestimating the cognition activity, in the contemplation drift. The cognition is interpreted by German philosophers much wider, it is studied not only in relation to natural subjects, but also in its links with social, ethical and aesthetic phenomena. It was I. Kant who first raised the issue of cognition activity as an epistemological problem. According to Kant, a person's cognitive abilities are manifested in the special forms that subordinate and organize the knowledge content: Thus, if the old materialists had the dependence of thinking on feelings as the object of the study, then Kant focused his attention on sensory visual representations dependence form the "pure" priori forms of mind (Bendasiuk, 1997, p. 189).

In his works I. Fitkhe considered only the essence of knowledge. At the same time, he considered the feeling was not a reflection of reality, but a product of a subject's creativity. The cognition process is considered by Fitkhe as the process of creating reality and activity as the basis of knowledge (Kornilov, 1989). The principle of knowledge activity and

effectiveness was thoroughly investigated by G. Hegel. His "Absolute Idea" is not only about thinking, but about being. The cognition in Hegel's theory is represented as self-education (self-development) of "absolute idea". Comparing Kant and Fichte, the problem of cognitive activity is considered by Hegel more thoroughly. For the first time in history, he introduced the element of practice into cognition theory. Hegel analyzed the cognition as active human activity, introduced into the process of social history, in interrelation with other forms of activity. The search for ways to overcome the difficulties in education system development in Ukraine makes us turn to the study and analysis the Ukrainian educators' heritage while formatting and strengthening the power of the Middle-Age East-Slavic state.

Domestic culture saving and development, education growth, people's national and religious interests protection as the directions of reformist ideology were incidental to cultural and educational centres of that time. The ideological struggle against theocracy of Catholic ideology was led by brotherhoods as centres for national culture and people's cultural values protection. Thanks to brethren schools network system the education and patriotic literature was growing, the Orthodoxy was strengthening as a means of fighting against the colonial policy of the Polish gentry and the Catholic clergy. The most significant contributions to these processes were made by Lviv, Kyiv and Lutsk brethren schools.

The prominent educators of that time were Professors Petro Mohyla, Joseph Kononovich-Gorbatskyi, Innocentiy Hisel, Ionikiy Galyatovskiy, Lazar Baranovych, Stefan Yavorskyi, Theophan Prokopovych, Georgy Shcherbytskyi, Heorhiy Konyskyi and others (Khyzhniak, 1988).

P. Mohyla, in his own works, preached ascetic ideals, self-knowledge, moral self-perfection, unity with God. The Professor of Philosophy I. Kononovych-Gorbatskyi acknowledged the objectivity of the world and its cognition, shared the basic doctrine of sensualism that knowledge began with experience and sensations. In his theory, the main role belongs to the human intelligence. The professor pointed out the path to the knowledge of God through the cognitive activity of mind. The theory of cognition by S. Yavorskyi is based on the principles of I. Hisel's doctrine. By approving sensational ideas, he admits the possibility of mind existence regardless sensory datum, brain, body, and believes that logic as science manages



human mind actions, emphasizing the greatness, power, independence and activity of a man.

Explaining the theory of cognition for students, Professor H. Konyskyi emphasized the infinite possibilities of a man in learning the world and himself. At the heart of knowledge lies the mind: true only that which is proved and comprehended by reason. Professors of the Kyiv-Mohyla Academy made a significant contribution to the theory of knowledge, contributing to the development of scientific thought on the Ukrainian soil of medieval scholasticism, the Renaissance and Enlightenment.

Graduates from the Academy H. Skovoroda and M. Lomonosov were the speakers of advanced progressive ideas that contributed to the formation of a way of vision and comprehension of the world. Promoting the problem of self-knowledge of a man, H. Skovoroda emphasizes that knowing himself means to know the logic of the universe, to understand God in himself. The role of science and education, according to M. Lomonosov, is based on the materialist worldview, it was not a recipe for learning: in their synthesis, they were quite a logical, scientific, complete picture. Innovative pedagogical ideas of M. Lomonosov were designed to create favourable conditions for the formation and development of cognitive abilities of students. Educational significance of his legacy is in a progressive, democratic, humanistic approach to education.

One of the most famous thinkers of that time was Jacob Kozelskyi. The most important problems of epistemology, psychology, logic, social philosophy are represented in the original work "Philosophical sentences". Y. Kozelskyi believed that human knowledge begins with the senses; it is they who give an impression to the soul. At the highest level, knowledge is characterized by logical thinking, inherent only to a man. At the sensory level, certain properties of things are learned, at the highest – the essence of things, the process and patterns of their development.

The study of cognitive activity is devoted to a significant part of the scientific work of P. Lodia – professor of Lviv University. In addition to the adaptation of Western European educational ideas in the Ukrainian spiritual culture, he directed his efforts to study questions of the theory of cognition and logic (Gorskyi, 1996).

The philosophical credo of M. Hohol is romantic perception of the world. He considered the meaning of human life is in life itself. And there is no other purpose for a person than real existence (Philosophy, 1995). The essence of M. Hohol's creative quest was manifested in the rout to knowing the spiritual essence of a man. The idea of "education" of the soul, he contrasted with commitments to human intelligence improvement.

The nineteenth century was marked by enlightenment movement with the main feature to reach common literacy. K. Ushynskiy's knowledge doctrine grounds basis of materialist dialectics and the doctrine on feeling and will lays the basis of the materialist theory for upbringing (Ushynskiyi, 1945). In the centre of Taras Shevchenko's ideas – a person, his/her life destiny, "... natural inalienable rights inherited from free and heroic ancestors, inseparability of labour and humanity, freedom and social justice" (Philosophy, 1995, p. 147). T. Shevchenko's achievements clearly testify to the high level of his inner needs, clearly defined ideological orientation, and high aesthetic qualities. T. Shevchenko's worldview ideas became crucial for his followers, inspiring them to civic service to Ukraine.

Kyiv is the most prominent centre for enlightenment in the mid-XIX century. Thinkers, striving to combine the ideas of enlightenment and romanticism, note the role of feelings, human experiences in the inner activity of a person. A famous figure among the Kyiv Philosophical School representatives was P. Yurkevych. His study was directed to morality area. Investigating the process of cognition, he believed that this process is carried out in three forms: 1) knowledge through representation; 2) knowledge through concepts; 3) knowledge through the idea.

Mykola Kostomarov, Panteleimon Kulish, Oleksandr Potebnia, Mykhaylo Drahomanov and other intellectuals of Ukraine made a significant contribution to new intellectual culture development based on reality comprehension, social and political life analysis.

M. Kostomarov made a significant contribution to theoretical substantiation of the Ukrainian idea philosophy, according to which the main content and direction of the historical process is determined by the people.

At the heart of O. Potebnia's provisions on a person's cognitive activity there is language and thinking interrelation (Philosophy, 1995).

The creative legacy of the prominent philosopher, sociologist, historian, and publicist M. Drahomanov concerns a matter of Ukrainian cultural life various branches. The determinism he defines in the only reliable way to explain the phenomena. According to him, the highest value is a person, and the highest criterion is the idea of justice (Drahomanov, 1991).

The main direction of education development in Ukraine at the end of XIX and early XVIII centuries identified leading tendencies common to new generation of national conscious intellectuals. Prominent thinkers and socio-political figures of that time were Volodymyr Lysevych, Ivan Franko, Lesia Ukrainka, Volodymyr Vernadsky, Mykhailo Hrushevskyi, Volodymyr Vynnychenko and others.

Relying on positive knowledge, V. Lysevych's philosophy does not deny the active role of the subject while cognition. The main object of I. Franko's and Lesia Ukrainka's philosophy was a person in his/her unity with nature, the meaning of his/her life, his/her uniqueness, consciousness and dignity. The views of these artists are echoed in that the purpose of knowledge to come to the truth (*veritas*). The *veritas*, according to I. Franko, is the unity of cognition and practical activity methods. I. Franko's and Lesia Ukrainka's sense of global consciousness marked the peak of a person's philosophical comprehension of the world through the spiritual-figurative disclosure of social life contradictions (Philosophy, 1995.). Their artistic heritage, along with journalistic and scientific works, enriched the Ukrainian spiritual culture by its content, deepening the development of a person's cognitive activity problem as an independent component of educational thought.

As a thinker-scholar, V. Vernadskyi was in that advanced of his time that only now the one can appreciate the genius of his achievements and scientific predictions. The scholar initiated the holistic philosophy of the universe, was one of the anthropocosmism founders as a system that unites the harmonious whole of the natural-historical and socio-humanitarian tendencies of science development (Vernadskyi, 1988). At the heart of the thinker's philosophical worldview is the belief in the power of a person's activity, in his/her mind.

Among of the Ukrainian intellectuals representatives in the first decades of the XX century the special place belongs to M. Hrushevskyi and

V. Vynnychenko. M. Hrushevskyi's historical concept represented in 2000 scientific publications on problems of culture, history, education and based on the principles of systematicity, unity, consistency, historical and logical in knowledge. The basis of the scientist's approaches to the knowledge of the historical process – the requirement to follow not priori conclusions from the eternal and unchangeable principles of human thinking, but inductive search on the basis of factors that take into account the biological, economic and, above all, mental factors (Hrushevskyi, 1993).

From the position of development of the problem of cognitive activity V. Vynnychenko confessed that the direction of philosophical ideas should be based on searching human happiness (Vynnychenko, 1990). Conceptual approaches of the artist to society development testify that people are the main driving force.

The rise of spiritual life is celebrated in the 30s of XX century. Being in the market for "actual" questions of historical and dialectical materialism Ukrainian researchers work on the problems of sociology, logic, and psychology. Despite all the prohibitions the philosophical views of H. Skovoroda, professors of the Kyiv-Mohyla Academy, philosophical and socio-political ideas of the Cyril-Methodius Society, figures of the Ostroh Scientific and Educational Centre were studied. The early socialist period of Ukraine is characterized by constant discussions, polemics of scientists about methods and forms of understanding the world, its essence of historical development, main driving forces, and so on. There was real confrontation between the orientations of "Moscow" official institutions and the cognitive interests of Ukrainian researchers.

Modern scientific thought should redefine the scientific heritage of outstanding scholars, thinkers, and figures of this period: the M. Khvylovyi, M. Skrypnyk, D. Dontsov, A. Makarenko, V. Lypinskyi, V. Yurynets, D. Chizhevskyi, O. Olzhych (Kandyba), I. Mirchuk, P. Kopin, V. Sukhomlynskyi and others, objectively shown their contribution to cognitive problems development, of spiritual revival issues for the Ukrainians.

During the 70's and 80's there is a change in the emphasis of philosophical searches vector; there is a step away the problems of dialectical materialism to expanding ideological themes. The new problems of

worldview formation, its connection with scientific knowledge, a man and nature interaction, methodology, the world creation etc. are explored.

From the standpoint of modern philosophical approaches, the result of any knowledge is the image as an ideal generalization of an object's essential relations. There are sensory and rational cognition where the sensory knowledge is primary. There are three forms of sensory knowledge: sensation, perception and presentation. With the help of a person's senses only certain properties of objects, phenomena are known. On the basis of sensations perception is formed – the integral reproduction of the object. As a result of repeated perception of an object, the consciousness of a person can hold him in memory, and if necessary, reproduce a generalized image. Representation – a generalized image of an object, perceived before. In general, forms of sensory knowledge reproduce the object in a figurative form (Philosophy, 1995).

Rational knowledge, in contrast to the sensory, penetrates into the essence of objects, phenomena, processes. In the same way as forms of rational cognition, distinguish concepts, judgments and inference. Usually, concepts are defined as one of the main forms of reality reflection on the level of abstract thinking, they enable to distinguish those qualities of an object that cannot be pictured via an image.

Modern cognition theory considers judgment as a process where our knowledge is shaped, changed and evolved. The combination of several judgments forms an inference. This form of rational knowledge gives an indirect and generalized idea of reality and its reflection in human consciousness. The ability to make the inference is a sign of a person's intellectual growth. It is important for solving the activity problem the ability of making inferences is improved as a result of education and upbringing. Naturally, in cognitive practice, one cannot absolve sensory or rational forms of knowledge: only combination of these forms phenomena and processes essence knowledge can make for veritas.

Conclusions. Consequently, the effectiveness of studying students' educational and cognitive activity depends on how thoroughly the cognitive process is studied, the way its laws and features are used. Taking into account the possibilities of the cognition theory, its Klondike was set in the Ancient world era and filled with new content rising to a new level in each generation,

allows to predict the problem studying vector and put forward the hypothetical predictions of its solution.

Prospects for further research may be related to psychological and pedagogical conditions studying for educational process improvement by means of activating students' cognitive activity.

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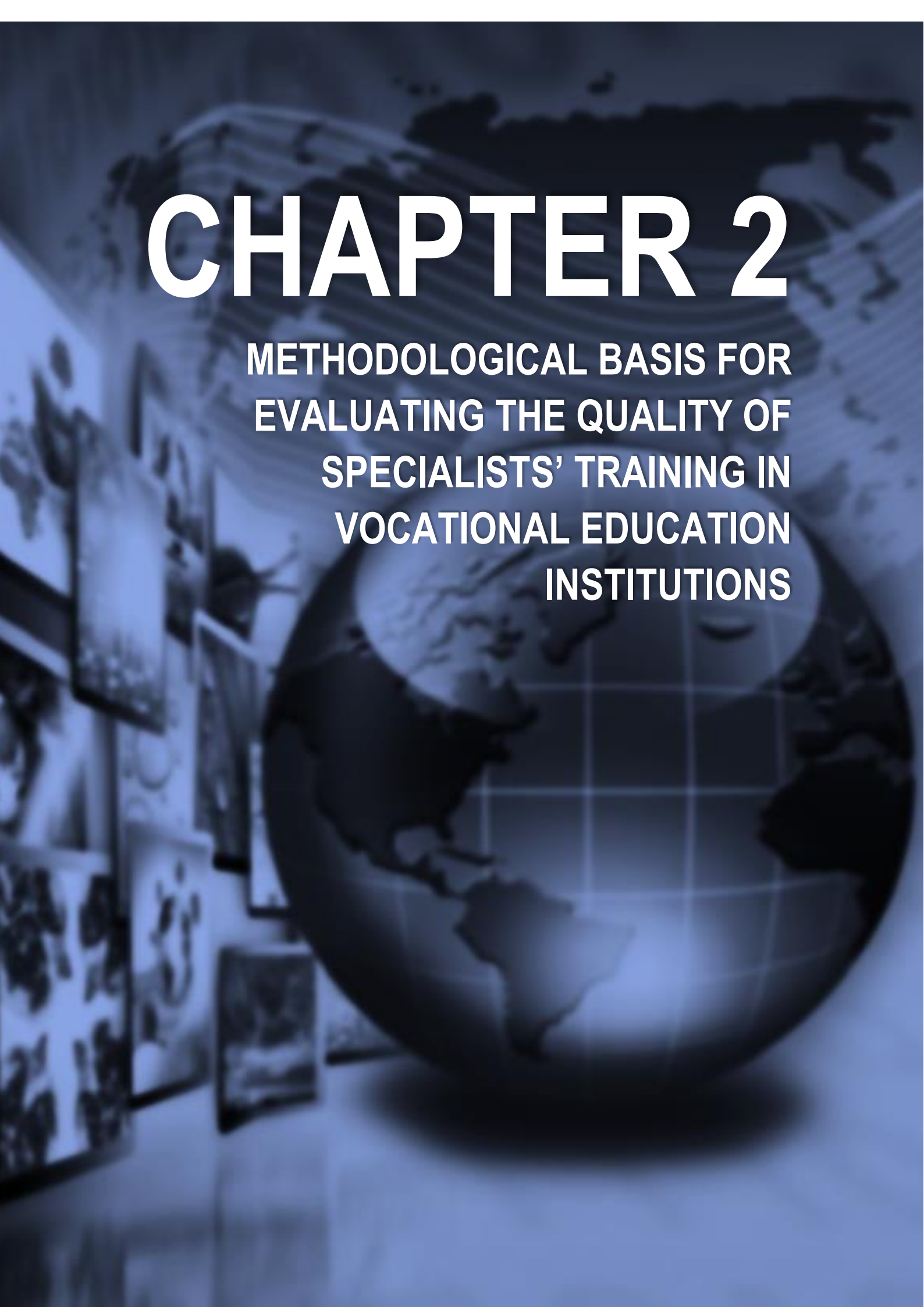
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# CHAPTER 2

**METHODOLOGICAL BASIS FOR  
EVALUATING THE QUALITY OF  
SPECIALISTS' TRAINING IN  
VOCATIONAL EDUCATION  
INSTITUTIONS**





## 2.1. METHODOLOGICAL FEATURES OF QUALITY ASSESSMENT OF THE TRAINING OF SPECIALISTS IN CONSTRUCTION COLLEGES

### *МЕТОДИЧНІ ОСОБЛИВОСТІ ОЦІНЮВАННЯ ЯКОСТІ ПІДГОТОВКИ ФАХІВЦІВ У КОЛЕДЖАХ БУДІВЕЛЬНОГО ПРОФІЛЮ*

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*The actuality of education of students in educational institutions of the construction profile is focused on the creation of specific vital objects (buildings, communications, sports complexes, bridges and other buildings); the educational process is sensitive to the emergence of new priorities in education, changes in educational paradigms and the adoption from mass-reproductive forms and methods of teaching to individual and creative ones; pedagogues of construction education institutions need to substantiate modern adequate forms and methods of monitoring the formation of students' current competencies, which proves the expediency and importance of researching the methodological features of assessing the quality of specialist training in building colleges.*

*The goal: disclosure of methodical features of assessment of the quality of training of applicants of professional preliminary higher education in colleges of the building specialization.*

*The methods: theoretical (study of philosophical, psychological-pedagogical, methodical literature and normative documentation regarding the researched problem; comparative analysis, synthesis, classification, generalization regarding the problem and subject of research), empirical (observation, conversation, study and generalization of the experience of pedagogical activity).*

*The results: a theoretical study of the problem of assessing the quality of training of future specialists in scientific sources was carried out, the peculiarities of its implementation in colleges of the building specialization were analyzed.*

*Conclusions: it was found that the ultimate goal of evaluating the quality of training of future specialists in colleges of the construction pro building specialization file is an objective view of the result of training (the formation of the competencies of future specialists); the peculiarities of the assessment of the quality of the training of specialists in the colleges of the building specialization are substantiated (predominance of forms and methods of graphic assessment); it was shown that effective assessment contributes to the improvement of the educational process.*

*Актуальність: навчання студентів у закладах освіти будівельного профілю орієнтоване на створення конкретних життєво важливих об'єктів (будівель, комунікацій, спортивних комплексів, мостів та інших споруд); освітній процес є чутливим до появи нових пріоритетів в освіті, зміни освітніх парадигм і переходу від масово-репродуктивних форм і методів викладання до індивідуально-творчих; педагоги закладів освіти будівельного профілю мають потребу в обґрунтуванні сучасних адекватних форм і методів контролю сформованості актуальних компетентностей студентів, що доводить доцільність і важливість дослідження методичних особливостей оцінювання якості підготовки фахівців у коледжах будівельного профілю.*

*Мета: розкриття методичних особливостей оцінювання якості підготовки здобувачів фахової передвищої освіти у коледжах будівельного профілю.*

*Методи: теоретичні (вивчення філософської, психолого-педагогічної, методичної літератури та нормативної документації щодо досліджуваної проблеми; порівняльний аналіз, синтез, класифікація, узагальнення щодо проблеми та предмета дослідження), емпіричні (спостереження, бесіда, вивчення та узагальнення досвіду педагогічної діяльності).*

*Результати: здійснено теоретичне дослідження проблеми оцінювання якості підготовки майбутніх фахівців у наукових джерелах, проаналізовано особливості його здійснення у коледжах будівельного профілю. Висновки: з'ясовано, що кінцевою метою оцінювання якості підготовки майбутніх фахівців у коледжах будівельного профілю є об'єктивне уявлення про результат навчання (сформованість компетентностей майбутніх спеціалістів); обґрунтовано особливості оцінювання якості підготовки фахівців у коледжах будівельного профілю (переважання форм і методів графічного оцінювання); показано, що ефективно оцінювання сприяє вдосконаленню освітнього процесу.*

**Keywords:** vocational pre-university education, assessment, quality of specialist training, graphic method of assessment



**Ключові слова:** фахова передвища освіта, оцінювання, якість підготовки фахівців, графічний метод оцінювання.

**Introduction.** Build is a unique type of activity that accompanies humanity at all stages of evolution. Even during the years of crisis phenomena caused by political or economic factors, build continues to

develop actively, being the driving force of economic growth. In this connection, there was an objective need for highly qualified technical specialists. The Occupation builder has always been and will be one of the most sought-after by society, therefore the problems of effective professional training of students studying build specialties become particularly significant in the conditions of the post-war reconstruction of the infrastructure destroyed by the war.

**Sources.** The problems of assessing the quality of specialist training in higher education institutions are in the center of attention of pedagogical science, as evidenced by numerous conceptual and worldview studies of domestic and foreign scientists. Evaluation as a specific component of the educator's professional activity was investigated: I. Bulak, A. Vashchenko, N. Volkova, Yu. Zhuk, V. Lozova, I. Pidlasy, V. Polonsky, V. Sergienko, I. Shmygol, and others. The problem of evaluating educational achievements of students was the focus of attention of S. Babinets, T. Berezhynska, I. Bulak, N. Vanina (2021), O. Jezhula (2007), S. Kalaur, T. Kanivets, S. Kretovych, R. Kubanova, L. Kutepova, O. Lokshina, P. Luzana (2021), L. Lutchenko (2012), I. Mosya (2021), N. Pasichnyk (2012), T. Pashchenko (2021), O. Sokolyuk, O. Titova (2021) and others. Practically all researchers of the problems of assessment and quality assurance of professional training of specialists focused on the results of training, substantiated the essence of pedagogical evaluation as «the process of establishing the level of educational achievements of students in mastering the content of an educational discipline (topic, module, etc.) according to standardized requirements» (Luzan et al., 2021).

Certain aspects of the use in the evaluation of innovative technologies were highlighted in the scientific works of leading domestic and foreign scientists, in particular: H. Agrusti, L. Artemchuk, B. Bell, P. Black, I. Bulakha, V. Vember, D. Wilmut, L. Dybkova. Also important for our research were the works on graphic training of students P. Buyanov, V. Vitchenko, A. Gedzik, I. Goliyad, O. Jezhula, M. Kozyar, T. Olefirenko, G. Raykovskaya, V. Sydorenko, N. Tytova, M. Yusupova, and others.

However, we believe that the problem of assessing the quality of specialist training in build colleges has not been sufficiently researched. In particular, the substantiation of the peculiarities of the evaluation of the

quality of the training of future construction specialists in the institutions of vocational pre-higher education, the mechanisms of the use of forms and methods of graphic evaluation of the quality of the training of the future specialist in the building structure by teaching staff have not been sufficiently investigated, insufficient attention has been paid to the implementation of innovative technologies for the evaluation of the quality of the training of specialists in build colleges. There are no studies in which the method of assessing the quality of training of future builder specialists is scientifically substantiated.

**The goal of the research** consists in the disclosure of methodological features of the assessment of the quality of training of applicants of professional preliminary higher education in colleges of the building profile.

**Methods:** theoretical (study of philosophical, psychological-pedagogical, methodological literature and normative documentation regarding the researched problem; comparative analysis, synthesis, classification, generalization regarding the problem and the subject of research), empirical (observation, conversation, study and generalization of the experience of pedagogical activity).

**Results and discussion.** Researches of questions of evaluation of the quality of training of specialists made it possible to find out that its ultimate goal is the result of training, that is, the formation of competencies of future specialists. In turn, the evaluation of the development of students' competencies allows improving the learning process, creating opportunities for improving the learning process. The methodology for evaluating the quality of specialist training in build colleges includes a set of forms (oral survey, independent work, control work, dictation, graphic assessment, test, colloquium, assessment, exam, essay, business game, multimedia presentation, web quest, portfolio); types (external, mutual, self-assessment) and methods (oral, written, graphic, programmed, combined, practical, coaching, assessment method in "inverted learning", mind map method, case method, etc.) of evaluating the quality of specialist training that are implemented in contact and virtual educational environments. The implementation of the technology for assessing the quality of specialist training in colleges of the building profile involves ensuring the assessment

of the formation of all student competencies due to the fact that certain types of assessment perform different functions (developmental, motivational, emotional-reflective, warning, corrective, educational, assessment-diagnostic, informational, planning, educational, differentiating, generalizing, establishing feedback, prognostic, socializing).

The analysis of the experience of training future build workers makes it possible to assert that the peculiarities of the quality assessment of the training of specialists in the colleges of the building profile are the predominance of forms and methods of graphic assessment. Thus, we will consider more detailed methods and forms of graphic evaluation of students' success, future builders.

The analysis of the activities of specialists in the build industry indicates the need for the structure and content of the graphic training of future builders in colleges to shift the emphasis from teaching graphic activities to the formation of graphic concepts. This is explained by the fact that during production activities, the builder does not have to develop drawings, but there is a need to correctly read ready-made drawings of certain structures and build them without mistakes according to these drawings. The success of such activity directly depends on the level of formation of graphic concepts in particular and the level of development of thinking and imagination in general. The process of formation of graphic concepts requires and occurs during the execution of graphic constructions as a component of the educational and cognitive activity of a student of graphic training.

The basis for mastering educational disciplines that form the foundation of technical training («Engineering geodesy», «Theoretical mechanics», «Resistance of materials», «Building structures», «Reinforced concrete and stone structures», «Metal structures», «Wood and plastic constructions», «Architecture of buildings and structures» (including implementation of a course project), «Technology of construction production» (including implementation of a course project), «Organization of construction», «Basics and foundations» (including .h. implementation of the course project)) is a graphic training received in classes in the discipline «Drawing geometry and engineering graphics», which contributes to the development of future builders' spatial thinking, without which their design and inventive

activities are impossible. In addition, disciplines that require graphic training instill in students such important qualities as accuracy, patience, give skills to work with reference literature and regulatory and technical documentation.

The graphic method of assessing the success of construction profile college students includes the following types of tasks: mini-graphic tasks, calculation-graphic tasks, individual graphic tasks, multifunctional tasks, professionally-oriented graphic tasks, complex situational tasks, course and diploma projects.

In computational and graphic tasks, attention is focused on the computational part of image construction. In mini-graphic tasks on sketch images of the necessary products and structures in order to develop students' graphic competences, their spatial image.

Individual graphic tasks are tasks of a traditional nature that require careful elaboration of drawings, which are performed as part of independent extracurricular work and involve the teacher's consultation.

Multifunctional tasks are applied in nature, they are related to the future professional activity of construction bachelors and require the manifestation of integral engineering and graphic competence during their implementation.

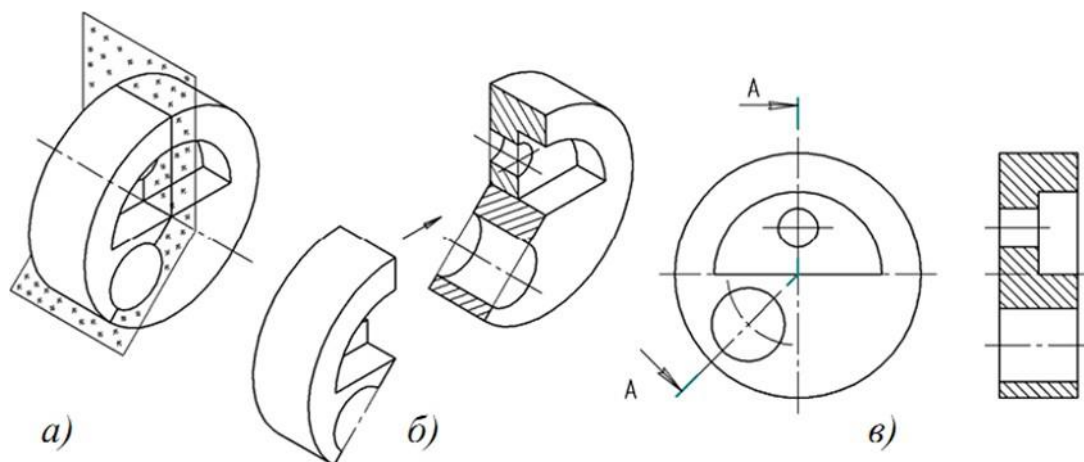
For diagnostics of the initial level of knowledge (discipline «Engineering graph») are applied. Their implementation does not require a large expenditure of study time, but at the same time gives a comprehensive picture of the student's readiness to learn new educational material. Mini-graphic tasks suggest a sketch solution within a limited time and are the most informative for students' mastery of a certain topic of the discipline, motivating thoughtful, meaningful mastery of the subject.

It is worth noting that the interactivity of the educational process involves the activity of students, which consists in their active participation in the process of evaluating the quality of the performance of mini-graphic tasks. For this purpose, the teacher provides a mutual assessment procedure (work in pairs), which consists of students giving each other their previous scores on a five-point scale, before the exam.

Solutions of professionally oriented graphic problems are used for current, thematic (periodic) control of the necessary abilities and skills of graphic activity in the disciplines «Drawing», «Engineering graphics». The

selection of professionally oriented graphic tasks should be carried out taking into account a number of factors. Graphic tasks should: contribute to the formation of technical and graphic knowledge and skills; have a professionally oriented practical character; cover the most important educational topics; to answer equal graphic training of students (Dzhedzula, 2007).

For an example (**Example 1**), we will present the algorithm for solving a professionally oriented graphic problem, which involves the construction of a complex broken section of a part (Figure 1):



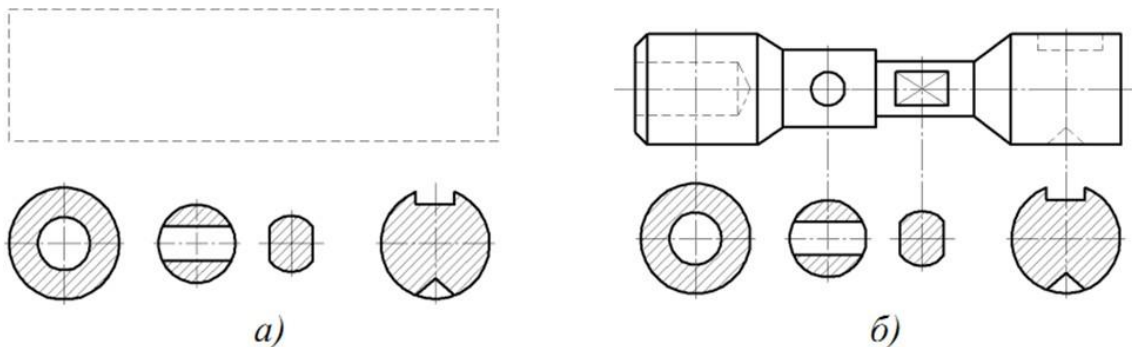
*Note. Created by the author.*

*Figure 2.1 Build of a complex broken section: a, b – visual demonstration of the stages of solving the problem; c – graphic presentation of the solution to the problem.*

- 1) analysis of the detail of the part in order to determine the optimal place for the intersection;
- 2) imaginary drawing of intersecting planes: main (profile) and auxiliary (Fig. 1, a);
- 3) to delete of a part of the detail located between the observer and the intersecting planes (Fig. 1b);
- 4) combining the detail's part cut by the auxiliary cutting plane with the part formed by the main cutting plane;
- 5) projection of the formed figure onto the profile plane of the projections; design of the result of solving the graphic problem (Fig. 1, c).

For thematic control, it is advisable to propose a problem-oriented task aimed at drawing out the shape of the object according to the indicated crosssectional figures (Figure 2).

**Example 2** (discipline «Engineering graphics»). Make a drawing of the part, the shape of which contains the specified sections (Figure 2).



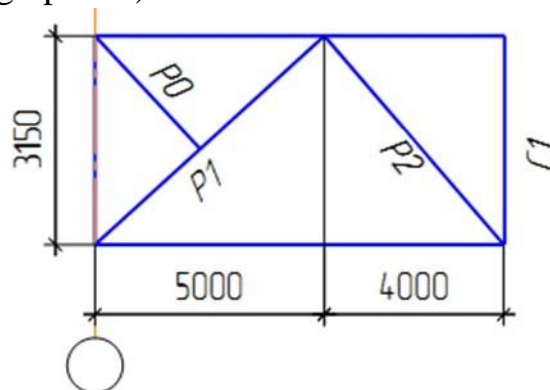
Note. Created by the author.

Figure 2.2. Problem-solving condition (a) and possible solution (b).

Computational and graphic tasks test the student's ability to use mathematical operations when designing image dimensions, the ability to perform calculations, knowledge of the algorithm of actions when designing an image of standard parts, the ability to use regulatory documents to find the necessary information, and others. Just as the minigraphics, they do not require a lot of academic time. An example of such a task is in Figure 3.

**Example 3** (the discipline «Fundamentals of calculations of building structures»). Calculate the length of braces P0, P1 and P2 of the metal farm shown in the diagram.

The task has a clearly expressed professional-oriented character, as it allows you to calculate the required length of profiles' metal according to the truss scheme. It should be noted that the task has two methods of solution (analytical and graphical).



Note. Created by the author.

Figure 2.3. An example of a calculation and graphic task.



Students perform computational and graphic work independently and under the supervision of a lecturer in practical classes. Tasks are performed step by step, in consultation with the lecturer. After the lecturer has checked the reporting materials from the calculation and graphic works and corrected the indicated deficiencies, the calculation and graphic works must be issued in compliance with the requirements given in the methodical instructions. Completed works are defended by the student and graded by the lecturer. During the defense of calculation and graphic works, the student must positively answer the questions, the main ones of which are given at the end of the corresponding section of the methodological instructions.

Individual graphic tasks are traditional and involve detailed processing of the image on sheets of drawing paper of a given format. The result of their execution is full-fledged drawings of details and structures. These drawings make it possible to diagnose the quality of the formation of graphic competence comprehensively. An album of graphic works made by students during the semester is a kind of portfolio.

A labor intensity of individual graphic tasks is on average from 2 to 6 hours, depending on the complexity of the task and the individual level of preparation of the student. Individual graphic tasks are type of formative, since their implementation requires a combination of various types of activities, such as independent work with regulatory documentation, calculations, constructions, etc.

Multifunctional tasks are used to assess the quality of specialist training in colleges of building profile. Such tasks are used for the current control of the «Architectural and construction design» section and contribute to the formation of professionally significant competencies, such as the ability to read design documentation, readiness to plan and perform work on the development of the graphic part of project documentation, readiness to plan and perform work on the development of the graphic part of project documentation, and others. **Example 4** of the task is shown in Figure 2.4.

Performing multifunctional tasks, students learn to think critically, find errors in ready-made drawings, build the necessary image based on a visual model or photo, which is valuable from the point of view of employers. The evaluation criteria for such a task are listed in Table 2.1.

It can be seen from Table 2.1 that the maximum number of points for a completed multifunctional task is 5.

For a multifaceted assessment of the quality of professional training, it is advisable to use complex situational tasks. They combine a heterogeneous test, computational and graphic tasks and multifunctional tasks that are connected by one professional situation. Completeness and correct carry out of a complex task determine the degree of resolution of this situation and indicate the level of graphic competence of a student of the

Cross out the main facade of the building, shown in the figure.  
Initial data for drawing development:  
Land level = - 1,200;  
Net floor level = 0.000;  
Floor height = 2,700.  
Sizes of balcony windows and doors are chosen according to DSTU B V.2.6 -15:2011  
“Window and door blocks”



build college.

*Note. Created by the author.*

*Figure 2.4. An example of a multifunctional task from the section  
«Architectural and Construction Design»*

The main advantage of such tasks is a comprehensive multi-level assessment of the quality of the formation of graphic competence, as well as accuracy in identifying gaps in its structure. Disadvantages of these tasks include the high labor intensity of their development and considerable time (compared to tests) for carry out and checking.

Competency-oriented tasks, being a type of educational tasks, occupy a special place in the structure of all components of the process of professional training, substantive, technological, control and evaluation. The educational task acts as a method, as a means of learning. In addition, the solution of the educational task allows to form and develop the internal motivation of students' educational activities.

Table 2.1  
Criteria of assessment of multifunctional tasks

Indicators	Recommended score
The facade is incompletely drawn, with errors, the requirements of the State Technical and Technical Service are not met. There are no sizes.	1
The facade is drawn with errors, the requirements of DSTU are not met. There are no dimensions or gross errors in calculations.	2
The facade is drawn with errors, the requirements of DSTU are partially met. Most of the dimensions are not set, there are errors in the calculations of the relative marks.	3
The facade is drawn correctly or with small errors, partially meeting the requirements of the State Technical Service of Ukraine. Almost all dimensions are set, calculated with small errors.	4
The facade is drawn correctly in compliance with DSTU. The dimensions are calculated and placed correctly.	5

At the same time, the task is nothing more than a unit of learned educational content. Finally, the solution of educational tasks is a simple and reliable way of simultaneously checking the quality of both the gnostic and the active components of student training. Such tasks are built on the basis of consideration of production situations, aimed at assimilation of knowledge by topics (sections) of the educational discipline (professional module), the ability to apply them. They are offered to students in the form of oral or test task, practical or laboratory.

Depending on the types of future professional activity, tasks of this type can be oriented towards solving technological, organizational-management and other issues, and the order of their execution can be reproductive or problem-searching in type.

A competence-oriented task organizes the student's activity, not his reproduction of information or individual actions. As an example of a competence-oriented task, you can consider the task for those who studies in the field of engineering and builder.

**Example 5. 1.** Using the «Compendium of standards for consumption of materials in build», calculate the need for materials (dry and taking into account moisture) for concreting 10 monolithic reinforced concrete columns with a cross section of 400x400 mm, a height of 4.2 m from heavy

concrete of class B15. The data in fig. 5. Write the obtained results in the empty cells of Table 2.2.

2. Pass the technological sequence of performing the main operations during concreting of monolithic columns. The total number of operations should not exceed 14. List the operations in the technological sequence in Table 2.3.

3. Write down in Table 2.4 the requirements for the quality of heavy concrete for concrete columns.

Table 2.2

The need for materials (dry and moisture-free) for concrete 10 monolithic reinforced concrete columns

The name of the materials	Consumption per 1 m <sup>3</sup> of concrete mixture	The need for dry materials for 1 column	Need for dry materials on 10 columns	Need in materials with moisture taken into account
Cement				
Sand				
Rubble				
Water				
Armature				
.....				

Table 2.3

Sequence of technological operations during concrete of monolithic column

Operation number	Name of the operation
1	
2	

Table 2.4

Requirements to the quality of heavy concrete for concrete columns

No	The name of the quality parameter	Description of the quality parameter
1		
2		
3		
4		
5		

With the introduction of new generation standards, the importance of independent work increases significantly. The need for it in education is due to the fact that the development of the subject of professional activity is impossible outside of the activity in which its goal is independently set, actions and operations are planned and implemented, the obtained result is correlated with the goal, methods of activity are adjusted, etc. The subject position of the student in education becomes the main condition for the formation of practical experience and, on its basis, the mastery of competences. This, in turn, requires the appropriate reorganization of the educational process in terms of the educational component, improvement of educational and methodological documentation, introduction of new information and educational technologies, updating of technical and software support for independent work, new technologies of self-assessment and current control of knowledge, skills and abilities.

To assess the quality of training of specialists in colleges of building profile in technical disciplines such forms of self-evaluation are often used:

- implementation of drawings, schemes;
- implementation of calculation and graphic works;
- solving situational production (professional) problems;
- preparation for business games;
- design and modeling of various types and components of professional activity;
- experimental design work;
- research and experimental work.

In the process of planning independent work, it is advisable to indicate not the types, but the approximate topic of independent work. At the same time, the topic should be presented in the form of tasks.

Students should be offered difficult reading material as homework. It is expedient, «having proposed a new educational content as a source material, to give the task of processing, transforming it into a certain kind of product with the help of certain independent works and operations, relying on some knowledge and cognitive skills. At the same time, acquiring knowledge becomes a necessary condition (means) for solving a specific educational and professional task (problem)» (Lutchenko, & Pasichnyk, 2012).

In modern practice, the following types of independent tasks are common in professional higher education institutions, within which various research methods are used, including surveys, the use of mathematical methods of data processing, laboratory observation, experiment, presentation of the obtained results in the form of a structured text, drawing up conclusions, etc.

Such forms of knowledge assessment as solving situational tasks and working with educational cases are quite common. Actually, the educational case is a description of a specific situation from a certain field of professional activity, written in an interesting (popular-journalistic) style. It contains a subject with a certain intrigue, containing a hidden or overt conflict (interests, positions, actions of various business entities and/or their consequences). Tables and diagrams illustrating the subject, etc., are often included in the case description. Sometimes the description of the situation of the educational case is accompanied by multi-page programs from which information is selected to solve the problem. Having familiarized themselves with the content of the educational case, students formulate the problem, diagnose the causes of its occurrence and substantiate the methods of solving contradictions (Pashchenko, 2014).

Business games, case-technologies, and the project method are among the assessment tools within which it is possible to simulate real professional situations. The main advantages of these tools are: a wide range of evaluated competencies; the possibility of organizing individual tasks; evaluation of both the result and the process.

Experience of practical activity, general and professional competences can also be formed in the process of solving practical (including project) tasks.

One of the traditional types of project tasks are term papers (projects) which are independent educational work performed during the academic semester (course) under the guidance of a teacher and aimed at solving an individual task or conducting research on one of the issues studied in a professional module (academic discipline).

In the training of specialists for the construction industry, it is important to teach the future specialist to acquire knowledge individually, to navigate well in the flow of constantly changing information, to be able

to think creatively and critically. A leading role in this for students of construction specialties is given to course design. Course design is carried out in the form of a course project or course work. Each student has different abilities, diligence, desire to achieve maximum results or be satisfied with some minimum. At the same time, they objectively weigh their capabilities in performing certain tasks. In this case, it is desirable to give students the opportunity to independently choose the type of course project, that is, with a simplified task, a task of medium difficulty or a more difficult task. In order for a student to receive a high grade, he can complete a course project (work) of an independent creative nature or perform a task that demonstrates in-depth and generalized knowledge. In this case, a different level of complexity can be achieved not only through individual, more complex tasks, but also by considering specific additional issues that require more in-depth knowledge and generalizations.

Course design is considered as one of the active forms and methods of learning that allow developing the creative thinking of young construction specialists when they solve specific problem situations. It is appropriate to note the special role of educational design in the development of the student's ability to perform professional functions in connection with the integral nature of tasks.

The importance of course design is determined primarily by the fact that it completes the development of the construction discipline, makes it possible to systematize the acquired knowledge during lecture, practical and laboratory classes. It is in course design that the main tasks related to the field of further professional activity of tomorrow's builders are solved.

In the process of completing the course project, the student applies all the acquired knowledge from certain and related disciplines. As a result, this gives the teacher the opportunity to carry out integral control of the acquired knowledge, to notice and eliminate problems in mastering the discipline. During the implementation of the course project (work), students widely use interdisciplinary knowledge obtained during practice; learn to design various objects; master various methods of calculations; draw various schemes, drawings; use normative and reference literature, periodicals to develop skills in working with books and electronic resources, etc. (Luzan et al., 2021).

Training plan of specialty 192 «Civil engineering» for certain construction disciplines, in addition to lecture, practical and laboratory classes, includes course projects that are considered as a type of educational work and are performed within the hours allocated in the curriculum for its study. A characteristic feature of course design is that the main amount of time is allocated to the student's independent work.

Many years of practice shows that course design, along with lectures, plays a significant role in the formation of a specialist and is the most important type of training lessons with students. In the process of course design, the following is carried out simultaneously: checking the level of theoretical knowledge, which is accompanied not only by their repetition, deepening and systematization, but also by developing the skills to use them when solving certain engineering tasks; formation and consolidation of students' engineering skills in decision-making and their practical implementation in the form of relevant design and construction documents.

In almost all institutions of higher education, where educational programs of the build profile are implemented, the topics of course projects are issued to students in the format of a general name, that is, they are not tied to any specific, real object. A student understands that he needs to develop a conditional task and it is unlikely was implemented in practice, and may not even be discussed by the scientific community. This circumstance reduces students' interest in the work being performed. And on the other hand, the assignment for the course design prescribes specific parameters of the object being designed, which does not allow the student to approach the design process creatively, to apply other parameters outside the assignment based on economic analysis or accepted criteria for the optimality of the object, etc. With this approach, the student does not have the opportunity to self-realize his creative and research abilities.

In order to solve this problem, it is necessary that the subject of course design is based primarily on the needs of the build market of the region, on the tasks of innovative production, on various scientific and research developments that are closely related to the discipline being mastered. Depending on the scope of the course project and the time allocated in the curricula for its implementation, it is desirable to specify in the assignment tasks that require a thorough study from the student.



The approximate topic of coursework for students to choose is formed based on the planned educational results of the professional module, and should also have a «task» formulation. The structure, design, training and defense regulations are determined by the Regulation on course work (course design) agreed with employers, which is part of the educational and methodological complex that ensures the implementation of the appropriate educational and professional program of the educational institution. To organize the defense of term papers, it is necessary to develop evaluation criteria that include indicators formed on the basis of planned educational results (Luzan et al., 2021).

Control over the implementation of the course project is carried out according to the schedule of control points that correspond to the main stages of the design (technical task, technical proposal, etc.), at each stage the use of a certain evaluation tool is provided. At the stage of the technical task, it is proposed to write an essay (the basis for entering an explanatory note to the project), a technical proposal to perform a presentation (justification of analog models, etc.), in the future, the presentation can become part of the overall presentation of the project, the evaluation of the execution of sketch and technical projects takes place in form of open review of works. At the stages of the technical proposal, sketch and technical projects, evaluation is carried out in the form of mutual evaluation, during which students fill out specially designed forms, a round table may be held, etc. The implementation of the working documentation of the project is evaluated by the teacher in a personal conversation, mutual evaluation is also possible by organizing the work of a «design bureau» among students. The form of project protection can also be varied, it can take place according to the «classic scheme», in the form of a business game, in the form of "protection at work" (a form of assessment when project protection takes place within the walls of a construction company), etc.

It is presented multi-stage evaluation significantly increases the reliability of the decisions made during evaluation procedures, and allows monitoring the dynamics of students' educational and professional achievements over a certain period.

Modern evaluation systems in professional education require a change in the position of the lecturer, who before studying a professional module, an educational discipline, presents the students with an evaluation system for the results of his is mastery. The position of the student also changes, who becomes an active participant in the evaluation process, which contributes to the awareness of the acquired experience of educational and professional activities and the integration of knowledge and skills in competence.

**Conclusions.** It was found that the ultimate goal of evaluating the quality of training of future specialists in colleges of the building structure is an objective idea of the result of training (the formation of the competencies of future specialists). The peculiarities of the assessment of the quality of the training of specialists in colleges of the building structure are substantiated (predominance of forms and methods of graphic assessment). It is shown that effective assessment contributes to the improvement of the educational process.

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## 2.2. THE TECHNIQUE FOR CONSTRUCTING THE TASKS FOR EVALUATING THE LEARNING OUTCOMES OF TECHNICAL COLLEGE STUDENTS

### МЕТОДИКА КОНСТРУЮВАННЯ ЗАВДАНЬ ОЦІНЮВАННЯ РЕЗУЛЬТАТІВ НАВЧАННЯ СТУДЕНТІВ ТЕХНІЧНИХ КОЛЕДЖІВ

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*Relevance is determined by reforming the content, methods, forms, technologies of engineering education, which is based on the competence approach and necessitates such diagnostic techniques that would effectively manage personality-oriented pedagogical interaction, objectively and reliably assess the level of mastery of components of educational and professional programs by future mechanics, technicians, technologists. Objective: to develop a methodology for designing and assessing the complexity of individual learning tasks as a step-by-step procedure based on the analysis of the*

*conditions of the proposed educational action and indicators of the novelty of its implementation by a student of technical college.*

*The research methodology is based on the unity of activity, system, personality-oriented and technological approaches, which has allowed to develop a student-centered, algorithmic (focused on the structure of educational activities) method of constructing individual tasks for assessing educational achievements of technical college students.*

*Results: (on the basis of the theory of gradual formation of mental actions), indicators of the description of educational actions in sequence of their formation are allocated (the form of representation of the contents of an approximate basis of action to the performer – the presence of the operation of the transformation of the object in the approximate basis – the form of representation of the object of action – the form of transformation of the object of action – the degree of novelty of the action performed for the student); examples of constructing a system of individual learning tasks of students are given.*

*Conclusions: the need to formalize the procedure for assessing the complexity of individual learning tasks of students by using indicators of the approximate basis of action, executive part and novelty of action for their differentiation from the simplest to complex, highly intelligent.*

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*Актуальність визначається реформуванням змісту, методів, форм, технологій інженерно-технічної освіти, що відбувається на основі компетентнісного підходу й зумовлює потребу в таких діагностичних методиках, які б дозволили ефективно управляти особистісно орієнтованою педагогічною взаємодією, об'єктивно й надійно оцінювати рівень опанування майбутніми механіками, техніками, технологіями компонентами освітньо-професійних програм.*

*Мета: розроблення методики конструювання й оцінювання складності індивідуальних навчальних завдань як поетапної процедури, заснованої на аналізі умови пропонованої навчальної дії та показників новизни її виконання студентом технічного коледжу.*

*Методологія дослідження базується на єдності діяльнісного, системного, особистісно-орієнтованого та технологічного підходів, що дало змогу розробити студентоцентровану, алгоритмізовану, орієнтовану на структуру навчальної дії методіку конструювання індивідуальних завдань оцінювання освітніх досягнень студентів технічних коледжів.*

*Результати: на основі концепції поетапного формування розумових дій виокремлено показники опису навчальних дій у певній послідовності їх формування (форма подання виконавцю змістової частини орієнтовної основи дії – наявність в орієнтовній основі дії операцій щодо трансформації об'єкта – форма подання об'єкта дії – форма трансформації об'єкта дії – ступінь новизни для здобувача освіти дії, що виконується); наведено приклади конструювання системи індивідуальних навчальних завдань студентів.*

*Висновки: доведено необхідність формалізації процедури оцінювання складності індивідуальних навчальних завдань студентів шляхом використання показників орієнтовної основи дії, виконавчої частини та новизни дії задля їх диференціації від найпростіших до складних, високоінтелектуальних.*

*Keywords: the complexity of the educational task, student, theory of the formation of mental actions and concepts, estimation, technique.*

*Ключові слова: складність навчального завдання, студент, теорія формування розумових дій і понять, оцінювання, методика.*

**Introduction.** The rapid growth of innovation processes in the economy and industry, the introduction of interacting high technologies (telecommunications, information, nuclear, nanotechnology, microtechnology, biotechnology, engineering, etc.) necessitate significant modernization of vocational education, including engineering and technical, and giving this process a systemic character. Based on the ideas of the competence concept, the technology of training the specialists should change significantly, the main criterion of which should be the quality of professional pre-higher education. Naturally, updating the content of technical education, methods, tools, forms, technologies of mastering modern knowledge by students should be accompanied by the development of such diagnostic techniques that would effectively manage personality-oriented educational process, objectively and reliably assess the level of students' mastery of the disciplines of the educational and professional program (Artiushyna et al., 2015).

These positions update the study of didactic problems on the principles, methods, tools for assessing students' knowledge. The study of tools and practices of multilevel control of educational achievements of future specialists in technical specialties is especially important and expedient. This is primarily due to the complexity of technical facilities and systems, features of modern professional activity of mechanics, technicians, the need for purposeful development of creative and technical potential of students and, accordingly, systematic reliable evaluation of their academic achievements (Titova, et al., 2019; Pashchenko, 2014).

At the same time, pedagogical science has not yet developed detailed theories and technologies that can reliably assess the level of mastery of future mechanics', technicians' professional skills, abilities, other complex competencies, defined by educational standards and learning outcomes. The lack of reasonable, (understandable to the general pedagogical community) valid diagnostic methods in some way affects the pedagogical practice. In particular, the tests used today to assess the level of professional competence

of graduates are often composed intuitively, without a clear analysis of the actions that a specialist should have according to learning outcomes. In addition, the level of complexity of the test task is said more than it is determined in practice: currently there is a lack of specific, practically grounded methods that can objectively assess the complexity of the educational (and, therefore, test) task and, consequently, the test as a whole.

Therefore, the problem of developing a methodology for constructing individual tasks for assessing the academic achievements of future specialists in technical specialties is extremely relevant for both pedagogical theory and educational practice.

**Sources.** According to many scholars, the leading didactic characteristic of the educational task is its complexity. Some researchers attribute the complexity of the task to the number of operations to solve it, other scientists, professing the provisions of psychological theory of activity, suggest calculating the complexity of the educational task taking into account levels of thinking and learning (Luzan et al., 2021).

In the scientific work (Naimushyna and Starychenko, 2010), devoted to the development of technology for estimating the complexity of educational tasks in Physics, it is proposed to take into account the following factors of complexity (when calculating): technical complexity (number of actions in solving problems); cognitive complexity (knowledge of formulas, laws, processes, creative application of knowledge, etc.); additional complexity (volume of text, system of equations, unusual problem, proportions, redundant data, etc.). It is not difficult to see that this approach is quite complex for practical application, and quantitative estimates of the significance of factors are plausible.

The algorithm for evaluating the structure and process of the educational task is substantiated in the dissertation of G. Kyrylova (2001). Here, the complexity of the educational task is proposed to be calculated by the following formula:

$$TD = f(T, K, H, N_h, N_a, N_z, N_w),$$

where the task difficulty function (TD) depends on time (T), number of attempts (K), frequency of decision making (H), number of erroneous decisions ( $N_h$ ), number of correct decisions ( $N_a$ ), number of objects and operations ( $N_z, N_w$ ).

Thus, the technology of estimating the complexity of the educational task of the just mentioned method is based on serious experimental work regarding accumulation of statistical data on the results of pedagogical measurements (task time, number of erroneous and correct decisions, etc.), which, in our opinion, reduces its practical significance.

We are impressed by the approach to solving this problem by scientists (Demin, 1990), who associate the complexity of technical objects with the design features of parts, assemblies or machines. The main positions of this theory are represented in the following provisions:

- the concept of "complexity" expresses the fact that the object (system, subject, phenomenon, object) consists of systems, subsystems, parts of systems, elements. The name itself (complexity) focuses primarily on the quantitative composition of the object;
- "difficulty" is a subjective reflection of the complexity of the object, its characteristics in terms of educational and cognitive activities. The difficulty is determined by the properties of the object under study;
- the carrier of the difficulty is the educational object;
- when selecting the content of training, it is necessary, first of all, to take into account objective didactic conditions, which determine the difficulty of technical objects to study (the presence of complex parts in the object; accessibility of the object for inspection; density of parts, etc.).

The method of determining the difficulty of educational objects by taking into account the didactic conditions that hinder the educational and cognitive activities of learners, of course, can be successfully applied where students are offered to study the design of real technical devices, machines and equipment. However, it does not take into account the peculiarities of instructional materials (task conditions), the form of presentation of the object of educational and cognitive activities, the proposed transformation operations, the degree of novelty for the student of the action performed, and so on.

Thus, in pedagogical theory there is still no clear answer to the question: in what sequence, by what criteria or indicators to determine the complexity of educational activities, develop control tasks and, accordingly, evaluate the results of implementation.



**The research methodology** is based on the unity of activity, system, personality-oriented and technological approaches, which provided an opportunity to develop student-centered, algorithmic (focused on the structure of educational activities) method of constructing individual tasks for assessing educational achievements of engineering students. The activity approach made it possible to consider the educational process as a complex multilevel activity, consisting of individual cognitive actions and operations, characterized by the transition from external practical action to internal mental action (Galperin, 1957; Talyizina, 1975). The personality-oriented approach allowed to introduce parameters of novelty of components of action for the student to indicators of complexity of the educational task. According to the requirements of the system approach, a set of indicators has been identified that reflects the student's mastery of the approximate basis of action, knowledge and skills of the actual implementation of operations to transform the object. This methodology determines the main task of the studied phenomenon – to develop a system of individual learning tasks that can systematically and consistently bring future engineers to higher levels of knowledge, as well as objectively and reliably differentiate students by levels of academic achievement. The technological approach helped to develop a method of designing (and evaluating) educational tasks as a step-by-step procedure, which first studies and analyzes the nature of the approximate basis of action (the form of execution of the contents and presentation of operations to transform the object), then performance indicators, then parameters of action novelty to establish the level of complexity of the task.

**Results and discussion.** According to the psychological theory of activity, the performance of an individual task by a student is a learning action, which is not only an object but also a means of learning; the ultimate goal of learning is the ability to perform certain actions. These positions are taken into account by the theory of gradual formation of mental actions (Galperin, 1957; Talyizina, 1975), which allows us to identify the structural and functional (internal) structure of action. The leading provisions of this theory are the basis for assessing the complexity of educational activities. Let's dwell on these aspects in more detail.

The dominant position of the theory of gradual formation of mental actions is that the functional construct of action consists of three components

– approximate basis of action (ABA), executive and control parts. Proponents of this theory are convinced that any human action is like a kind of management microsystem, which includes a tentative part – "governing body", executive – "working body" and control – mechanisms of tracking and comparison (Talyizyna, 1975).

ABA is an idea of the performer, his predictions about the composition and sequence of operations that he must perform. ABA consists of meaningful and logical parts. The meaningful part of the ABA is information about the object of action, and the logical part is information about the structure and nature of the transformations that the student must perform. Indicators of completeness and forms of its presentation are used to characterize the ABA. The completeness of the ABA submission is determined by the presence of all constituent elements of the object of action and the definition of operations for its transformation. The form of representation of the ABA is determined by the form of display of the object of action and operations for its transformation.

Example. *Complete ABA in material form* – factory instructions for use of household appliances – washing machine. Note that the instructions describe the object of action and operations for its application.

*The absence of ABA* is observed in the following training task: *adjust the gap in the intake valves of the D-240 engine*. It is not difficult to notice that the object of action that needs to be changed is named here, but there are no operations, tools and technologies of transformations in the given ABA.

Thus, to determine the nature of ABA, two indicators can be used:

1. The form of submission to the performer (pupil, student) of the contents of approximate basis of action (ABA).
2. Submission of operations for the transformation of the object to the ABA.

Each of these indicators has different types of implementation. Thus, the form of presentation of the contents of the ABA to the student can be:

*The real object*. A teacher or master demonstrates a real object, names and shows its components.

*Picture*. The student is given a picture (poster) with the image of the object, which is as close as possible to its natural state, and the perception of which does not require special training from the student.

*Drawings or diagrams.* To complete the learning task, the student receives a symbolic image of the object of action. In order to perceive and comprehend the information carried by such clarity, the student must be prepared in some way – be able to read and interpret drawings and diagrams. Possession of such specific skills and abilities is an important indicator of the level of professional competence of a person in certain professional activities.

*Description of the features of the object.* It is used when the student has formed an ideal image of the object of action, and the names of the elements are consciously associated with their real appearance. But in order to clearly define the field of activity, the student should be provided with information about the structure of the object of action, the name of its elements, and so on.

*Object name.* It can be used when the student is free to operate the components of the object of action in perfect shape.

Information about the nature and sequence of the operation to transform the object of action (logical part of the ABA) depends on the form of representation of the object and may be as follows:

*Real transformation.* The teacher or tutor demonstrates the transformation of the object and then asks the student to repeat the practical steps.

*Real transformation with linguistic explanation.* The teacher demonstrates to the student the real transformation of the object, accompanied by a verbal commentary on the practical demonstration of operations.

*Written instructions.* The student is shown the sequence of actions and described the operations for the transformation of the object.

*Named operations.* The operations to convert the object of the action are named, but it is not specified how they should be performed. For example: adjust the chain tension using the offset supports.

*There are no instructions.*

It may be worse noting, the first two options for presenting the logical part of the ABA are possible only if the substantive part is presented in material form.

Let's note that the ABA can be formulated by the performer or provided to him from the outside, it is constantly supplemented and improved in the process of performing the action. Completeness, accuracy and rationality of ABA are one of the determining conditions for the success of the formation

of skills for its implementation. ABA differs in the form of presentation of information: it can be given in textual, graphical or material forms. The application form of the ABA must correspond to the level of personal development and the level of training of the learner. For example, it is not possible to provide information about a complex object of action in the form of a drawing to students who have not mastered the course "Technical Drawing".

ABA also differs in the form of its formation: it can be completely ready-made, and can be formed by the student only independently or by analogy with similar previous actions. The higher the level of student's independence is during the preparation of the ABA, the higher its quality is – the strength of ideas, ease of transfer to new conditions and so on. It should be noted that the formation of ABA is a necessary condition, but not enough to decide that the student has mastered the necessary ability to perform the action. N. Talyizina (1975), one of the founders of the theory of gradual formation of mental actions, draws attention to this: "Whatever the quality of the approximate basis of the action is, and no matter how it is presented – in the form of ideas or external schemes – it still remains nothing more than a system of instructions on how to perform a new action, not the action itself. Our student does not have the action itself yet, he has not performed it at all, and without performing the action it is impossible for him to learn "(p. 64). Special attention should be paid to the last remark, as in the learning process some teachers are satisfied with the student's ability to explain how a certain action should be performed. Let's note that the student's explanation of the sequence and conditions for performing the action, learned by him from the lecture notes or textbook text, is not the actual action, but it is only a reproduction of its ABA, usually incomplete and inaccurate.

To fully master the action, the student must actually perform its executive part. Depending on the form of representation and transformation of the object, there are the following forms of action: material, materialized (perceptual), verbal (foreign, intralingual), mental.

Therefore, two main indicators are used to characterize the executive part of the action: the form of representation of the object of action and the form of its transformation. The form of representation of the object of action may have the following options:

*Natural object.* To complete the learning task, the student is given an object of action in kind – a real machine, a cut, an animal, a plant, a device, a seed collection, biological products, etc.

*Layouts or models.* The student is offered a specially prepared object for educational purposes, which in a real or simplified form reflects not only the external form but also the internal essence of the subject, the relationship and interaction of its elements.

*Picture.* To complete the task, the student receives a flat image of the object of action, as close as possible to the natural one.

*Schemes and drawings.* The object of the action is presented in a symbolic form, for which the learner must have a certain level of special training.

*Description.* The structure and characteristics of the object of action are presented in the form of text.

*Name.* Only the name of the object of action is communicated to the student.

The form of the transformation is related to the form of representation of the object of action and may have the following options:

*Material.* Real transformation of the object of action in order to achieve the desired results. It is only possible if the object is presented as a natural object, layout or model.

*Perceptual.* The transformation of the object takes place in the form of utterance (linguistic description of the procedure) of the contents of the action in the presence of visual support. It is possible with material and graphic forms of representation of the object of action.

*Verbal.* The transformation of an object takes the form of utterance (linguistic description of the procedure) of the contents of the action. It is possible if the object is presented in the form of a description and name.

*Mental.* The conversion of the object takes place in perfect shape without an external image and ends with a message of the result.

The material form assumes that the object is presented in real form, and in the process of action its material transformations are carried out: the machine is disassembled and tested, experiments with chemicals are conducted, biological medicine is prepared and studied, etc. Perceptual action differs from material action in the way that the object can be given in material

(real object, model, layout) or materialized (drawing, poster, stand, table, etc.) form, and its transformation is carried out visually. The conversion operation can be described in words. An example of perceptual action is the story of the operation of an induction motor using its layout or model.

Foreign language action is that the performer performs the entire operation of transforming an object into an oral (speaking) or written (describing) form without relying on a tangible or materialized object. That is, there is no object, it is just named. An example of an action in a foreign language is a story or description of the structure of a machine or the process of its operation from memory.

The intralingual form assumes that the performer speaks the operations if he thinks about their performance. Instead, the mental form of action implies that the student does not think about the contents and order of operations during the action.

Table 2.5  
Description and examples of actions in material form

Marking	Content of the action (operation)	Examples
1.1.1.1	To repeat (in material form) the procedure presented in material form and commented by the teacher.	1. After demonstrating and explaining to the teacher the sequence of measuring the density of the electrolyte with a hydrometer in the banks of the battery, repeat the operation. 2. After showing and explaining to the teacher the procedure for measuring power and electricity using a wattmeter and an AC electricity meter, repeat the operation.
1.1.1.2	To perform the operation in material form in accordance with the sample shown in real form or visually specified sequence of actions without linguistic explanation.	1. Draw a diagram of the technological process, which is performed by the teacher on the board. 2. After the practical demonstration of the operation of measuring the quality of the electrolyte by the teacher, repeat its actions.

Table 2.5 (continued)

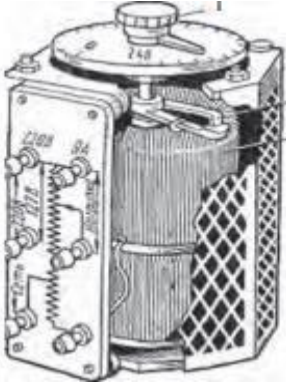

Marking	Content of the action (operation)	Examples
1.1.2.3	To perform the operation in material form according to the provided written or oral language instructions and graphic representation of the object.	<ol style="list-style-type: none"> <li>To study the characteristics of the engine with sequential excitation in idle mode, assemble an electrical circuit according to the provided scheme.</li> <li>Using the manual, select the components of the DC motor on the rack.</li> </ol>
1.1.3.3	To perform the operation in material form in accordance with the instructions provided in writing or orally.	<ol style="list-style-type: none"> <li>After the teacher explains the sequence of actions, set voltage of 12 V, 24 V, 110V on the output terminals of the laboratory autotransformer LATR.</li> </ol>  <ol style="list-style-type: none"> <li>Using the written instructions, adjust the clearances in the valves of the D-240 engine.</li> </ol>
1.1.2.4	To perform the operation in material form according to the given command to act.	<ol style="list-style-type: none"> <li>Demonstrate the sequence of passing the intersection by vehicles located on the model.</li> <li>Assemble the scheme of the experiment (physics, electrical engineering) according to the scheme provided in the instructions.</li> </ol>
1.1.3.4	To act as material form according to the instructions given in verbal form and the named components.	<ol style="list-style-type: none"> <li>Assemble the scheme of the experiment from the named components according to the verbal instructions.</li> <li>Using the list of components and parts of the engine, select on the racks those that make up the lubrication system.</li> </ol>

Table 2.5 (continued)

Marking	Content of the action (operation)	Examples
1.1.4.4	To perform an action in tangible form, knowing only the name of the object.	<p>1. Among the lighting devices presented on the shelves, select fluorescent, halogen and LED lamps.</p>  <p>2. Perform the electrical circuit of the welding equipment.</p>

Thus, using the provisions of the theory of gradual formation of mental actions, we can characterize the learning action on five indicators:

1. The form of submission to the performer of the contents of the ABA.
2. Presence of operations on transformation of object in the ABA.
3. Form of presentation of the object of action.
4. The form of transformation of the object of action.
5. The degree of novelty of the action performed for the student.

Using these indicators, you can give a general description of the actions in the sequence of their formation, improvement and complexity, both in terms of characteristics of the ABA and the characteristics of the executive part.

Here is a general description and examples of actions, starting with the simplest and ending with actions of high intellectual level (Table 2.5).

Listed actions (in Table 2.5) are performed in material form, but they differ in the level of presentation of the approximate basis. Performing such actions is very important, because without mastering the object in material form, it is impossible to form actions of higher intellectual levels. In our opinion, in the previous and current control, checking the formation of actions in material form should be mandatory.

Instead, when forming actions in perceptual or verbal forms, tasks can be used in which the ABA is presented in material form, and the executive part is carried out in perceptual, verbal or mental forms (Table 2.6).



It is not difficult to notice that, in the Tables 2.5 and 2.6 (examples), the complexity of actions changes from the simplest (material) to the most complex (mental). Naturally, a clear definition of the characteristics of actions as a learning goal allows to determine the level of mastering the material, which should be assessed by means of test control (Ilin et al., 2010).

Considering the indicators of action, it is not difficult to see that their combination affects the complexity of the educational task, requiring the learner to implement different levels of educational and cognitive activities. In view of the above, it is possible to assess the complexity of not only traditional but also test tasks, and, accordingly, to develop such tests that would really differentiate students or pupils according to their levels of academic achievement. This procedure can be formalized by entering the coefficient of complexity of the action. Let's focus on the quantitative method of assessing the complexity of educational activities in more detail.

Table 2.6  
Description and examples of actions in the perceptual, verbal and mental forms

Marking	Contents of action (operation)	Examples
1.2.1.1	To perform a verbal operation based on the material object, commenting on the actions performed in the material form by the teacher or demonstrated on the screen.	1. After watching the video "Threading" explain the procedure for cutting the internal thread with taps 2. After the practical demonstration of the technology of processing of external cylindrical surfaces by the teacher or master, comment on the rules of installation of cutters on a lathe.
2.1.1.1	On the object presented in the graphic form, show the order of transformation, reproducing a practical demonstration of the teacher or a fragment of the video.	Show on the diagram of the SKIF-310 combine the sequence of passage of the grain straw mass after the teacher explains the technology of the combine on the current stand.

Table 2.6 (continued)

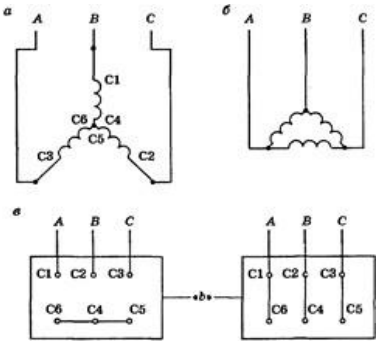
Marking	Contents of action (operation)	Examples
2.2.1.1	To perform the operation in verbal form based on the external image, commenting on the actions performed in material form by the teacher.	Show and explain the order of operation of the cylinders in the diagram of the engine SMD-62 after the demonstration by the teacher of its work in section.
1.2.2.3	To perform the operation in perceptual form according to the instructions with a diagram and verbal explanation.	Using the diagram and explanation instructions, find out and show the path of the oil from the pump to the valve rocker arm in the section.
1.2.4.4	To perform the operation in verbal form based on the external image of the given command to act.	<p>1. Using the layout of the intersection, name the sequence of traffic.</p> <p>2. Using the scheme of the combine "SKIF-310", name the units and aggregates through which the grain straw mass passes.</p> <p>3. Name which of the following connection diagrams of the stator windings of a three-phase induction motor is made "in star";</p>  <p>"in the triangle"; "in star and triangle on the terminal board of the electric motor"</p>

Table 2.6 (continued)

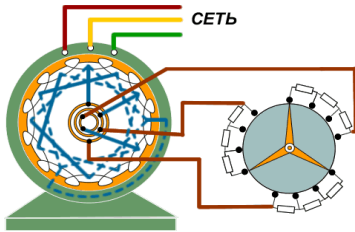
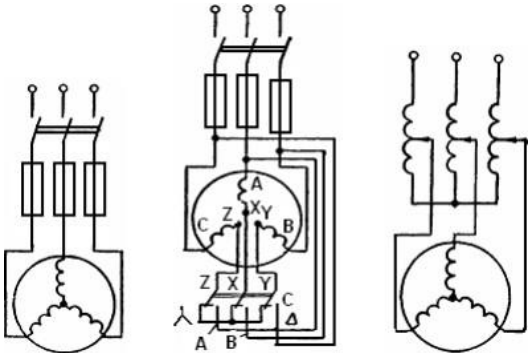
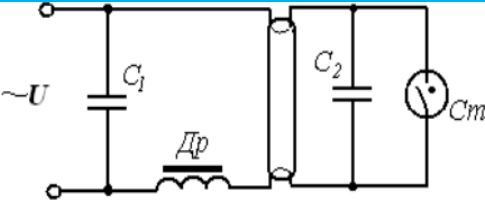
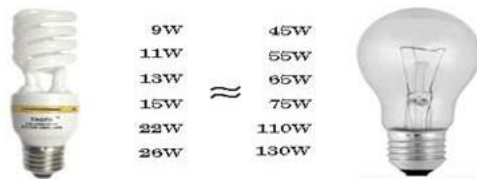
Marking	Contents of action (operation)	Examples
2.2.3.4	To perform operations in perceptual form according to the instructions given in verbal form.	<p>1. Using the assembly drawing of a two-stage reducer (conical-worm) select the details which can be made of bronze</p>  <p>2. Show the device which serves for reduction of starting current on the diagram</p>
2.2.3.4	To perform operations in perceptual form according to the instructions given in verbal form.	<p>1. Show the diagram of switching the stator windings of an induction motor from star to triangle.</p> 
3.3.3.4	To perform operations in verbal form by signs specified in verbal form.	<p>1. Name the order of movement of the plow unit on the slopes.</p> <p>2. Name the type of bearing that is installed on the driven shaft of the belt conveyor.</p> <p>3. Name the starting characteristics of DC motors.</p>
4.3.4.4	To perform operations in verbal form to determine certain features (components) of the named object.	<p>1. Name the parts of the bearing № 7306.</p> <p>2. Justify which parts of the worm gearbox should be made of bronze.</p> <p>3. Name the ways to connect three-phase motors to a singlephase network.</p> <p>4. Name the main advantages and disadvantages of induction motors.</p>

Table 2.6 (continued)

Marking	Contents of action (operation)	Examples
2.4.4.4	To perform operations in mental form on a graphically defined object.	<p>Bearing in mind the principle of operation of a fluorescent lamp with first-generation ballast, the switching scheme of which is shown in Fig. 1, explain what processes take place when connecting an electrical circuit to the network. What are the functions of the choke <math>D_r</math>? What is the purpose of the starter <math>C_t</math>? What is the role of capacitors <math>C_1</math> and <math>C_2</math></p>
2.4.4.4	To perform operations in mental form on a graphically defined object.	 <p>Fig. 1. The scheme of switching on a fluorescent lamp</p>
4.4.4.4	Forecasting the results of activities in which these objects are involved.	<p>1. Predict how the power consumption in the workshop will change if incandescent lamps (5 units 130 W, 15 units 110) are replaced by energy-saving fluorescent lamps.</p>  <p>2. Explain how the situation will affect the operation of the mover, in which after the electric motor, put not a sleeve-finger, but cam-disk coupling (Oldem coupling).</p> <p>3. Imagine that when designing a single-speed gearbox with a spur gear, you have decided: make the gears not of steel 40, but of wood. Explain whether such a gearbox will be workable, which will change due to changes in the material of the gears.</p>

Considering the indicators of action, it is not difficult to see that their combination affects the complexity of the educational task, requiring the learner to implement different levels of educational and cognitive activities. In view of the above, it is possible to assess the complexity of not only traditional but also test tasks, and, accordingly, to develop such tests that would really differentiate students or pupils according to their levels of

academic achievement. This procedure can be formalized by entering the coefficient of complexity of the action. Let's focus on the quantitative method of assessing the complexity of educational activities in more detail.

The analysis of the indicators described above shows that the simplest actions are characterized by the following features: *the object* is presented in material form; *the transformation* is performed in material form; *meaningful and executive parts* of ABA are set in material form; the action is performed by the student repeatedly (Ilin et al., 2010).

Thus, 5 indicators of description were used to evaluate this action. The coefficient of complexity for each of these indicators in the simplest case is taken as 1. Naturally, if in the future the action is complicated by a certain indicator, the coefficient should increase by a certain amount.

As a result of theoretical and practical research, we came to the conclusion that when complicating the signs of action on the indicator "*form of representation of the object*" the corresponding coefficient of complexity acquires the following values:  $K_{fo} = 1$ , if the object is presented in material or materialized form;  $K_{fo} = 1.1$ , if it is presented in symbolic form (scheme or drawing);  $K_{fo} = 1.2$ , if the description of the object is given;  $K_{fo} = 1.3$ , if the object is just named. If the object of action is not named in the educational task (the student has to choose it independently), then  $K_{fo} = 1.4$ .

Accordingly, if *the transformation of the object* is performed in material form, the coefficient of complexity of the action on this indicator will be  $K_{po} = 1$ ; at the perceptual form of transformation  $K_{po} = 1.1$ ; at verbal form  $K_{po} = 1.2$ ; if mental operations are performed with a given object, then  $K_{po} = 1.3$ .

It is accepted that according to the indicator "*Form of presentation of the meaningful part of the approximate basis of action ABA to the student*" the coefficient of complexity acquires the following values:  $K_{zch} = 1.0$  if the student is told that he must perform the learning activity on a real object; if the student is asked to use a drawing or diagram for this, then  $K_{zch} = 1.1$ ; description of the features of the object –  $K_{zch} = 1.2$ ; the name of the object –  $K_{zch} = 1.3$ ; in the absence of the meaningful part of the ABA in the task  $K_{zch} = 1.4$ .

According to the indicator "*Presentation of operations for the transformation of the object in the ABA*" there is also a rule: the coefficient

of complexity in the simplest variant of action has a value of  $K_{ip} = 1.0$ , and each variant of complication of action increases its value by 0.1. In particular, if in the educational task the student is asked to perform the educational task after the demonstration of actions with their explanation by the teacher or master on the real object,  $K_{ip} = 1$ ; if the student has to perform the same task after he has been shown the sequence of actions by the teacher without explanation,  $K_{ip} = 1.1$ ; when the logical part of the ABA is given only by the language instruction,  $K_{ip} = 1.2$ ; provided that in the task, the student is listed with operations that he must perform,  $K_{ip} = 1.3$ ; if the logical part of ABA is absent in the task,  $K_{ip} = 1.4$ .

It will be recalled that the values of the coefficients of complexity of educational activities on four indicators have been determined so far. The fifth indicator is integrative: it characterizes the learning activity depending on whether new or repeated for the student are signs of action and performance of the task as a whole. In view of the above, it was assumed that if the student has already performed such a task (all signs of action he had encountered before, he is familiar with the object, did similar operations to transform it, etc.), the coefficient of complexity of this indicator  $K_n = 1$ . If for the student one sign of action (for example, object) is new, the coefficient of complexity makes  $K_n = 1.25$ ; if there are two or three new signs of action in the task, the coefficient of complexity is  $K_n = 1.5$  and  $K_n = 1.75$ , respectively. Provided that all the signs of the action to be performed and met for the first time by the student, are completely new to him, the coefficient of complexity is  $K_n = 2$ .

The total coefficient of complexity of the action, and, accordingly, the learning task, can be calculated by the formula:

$$K_z = K_{fo} \times K_{po} \times K_{zch} \times K_{ip} \times K_n,$$

where  $K_{fo}$ ,  $K_{po}$ ,  $K_{zch}$ ,  $K_{ip}$ ,  $K_n$  – coefficients of complexity of the action on the relevant indicators (Ilin, Luzan, Rudyk, 2010).

Consider examples of determining the overall complexity of a simple and complex educational task according to the proposed method.

**Example 1.** *Using the provided drawing with explanation, find among the located on the rack (section, stand) parts that belong to the depicted mechanism, select and name them (the action is performed on a known student object).*

No	Performance indicators	Characteristics of the indicator	Coefficient of complexity on the appropriate basis
1	Contents of ABA	Drawings and explanations	1.0
2	Logical part of ABA	Verbal (instruction)	1.2
3	Object presentation form	Material	1.0
4	Form of transformation	Material and verbal	1.1
5	Novelty	The action is repeated	1.0
Total coefficient of complexity of action			1.32

**Example 2.** Name the parts that make up the crank mechanism of an internal combustion engine (the action is performed with an object that is already known to the student).

No	Performance indicators	Characteristics of the indicator	Coefficient of complexity on the appropriate basis
1	Contents of ABA	Object name	1.3
2	Logical part of ABA	Verbal	1.3
3	Object presentation form	Verbal (name details)	1.3
4	Form of transformation	Mental	1,3
5	Novelty	The action is repeated	1.0
Total coefficient of complexity of action			2.86

In the first example, the coefficient of complexity of action is  $K_z=1.32$ . This educational task is relatively simpler than the second one, in which the coefficient of complexity of action is  $K_z = 2.86$ . It is worth noting that if this action was completely new to the student, the specified parameter of the complexity of the task would be equal to 5.72.

**Conclusions.** Based on the provisions of the theory of gradual formation of mental actions and concepts, the following indicators of the complexity of the educational task are identified: the form of presentation of the contents of the approximate basis of action to the performer; the presence of actions of operations to transform the object in the approximate basis; the form of presentation of the object of action; the form of transformation of the object of action; degree of novelty for the student of the action being performed. The scientifically-grounded methodology of designing (and evaluating) the complexity of the educational task allows the teacher: to develop a complex, base of individual educational tasks for pupils or students on the principle "from simple to complex"; by purposeful selection of educational tasks with a certain degree of difficulty to develop educational and cognitive activities of students from reproductive, executive levels, to

productive, creative; to assess objectively the competence achievements of students, determine the level of quality of professional training of future mechanical technicians, electrical technicians, etc.; to interpret unambiguously the results of assessment of knowledge, skills and other abilities of students and effectively to manage the educational process.

Prospects for further research will be related to the substantiation of the technology of assessing the quality of training of specialists in technical specialties in colleges.

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## 2.3. THE TECHNIQUE FOR ASSESSMENT OF THE QUALITY OF SPECIALISTS TRAINING IN INSTITUTIONS OF VOCATIONAL EDUCATION

### МЕТОДИКА ОЦІНЮВАННЯ ЯКОСТІ ПІДГОТОВКИ ФАХІВЦІВ У ЗАКЛАДАХ ФАХОВОЇ ПЕРЕДВИЩОЇ ОСВІТИ

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*Relevance. Adequate functioning of any pedagogical system, including the system of training specialists in the college, is impossible without feedback, establishing the effectiveness of the educational process, evaluating the results of competency-based learning. At the same time, pedagogical science has not yet developed detailed theories and valid methods that would allow to reliably assess the level of students' mastery of professional skills, abilities, other complex competencies, defined by educational standards and learning outcomes.*

*The purpose – to substantiate the methodology (for assessing the quality of training specialists in colleges) on the basis of the analysis of essential characteristics of pedagogical estimation, features of the competence approach in professional pre-higher education.*

*Methods: theoretical (theoretical analysis of scientific sources, study of the requirements of professional and educational standards, educational programs, analysis of programs of academic disciplines – to clarify the state of the research problem and determine areas of scientific research; comparison – to study scientific approaches to solving the problem; analysis and synthesis – to develop a method for assessing competencies (educational outcomes), empirical (observation, testing – to determine the validity of tools, making adjustments to the assessment methodology; didactic experiment – to determine the importance of the topic and highlight the dominant learning elements).*

*Results. The essence of pedagogical assessment as a process of establishing the level of student achievement in mastering the content of the discipline (topic, module, etc.) in accordance with the standardized requirements is specified. There is a lack of sustainable approaches to the definition of "pedagogical control", "pedagogical (educational) monitoring", "pedagogical diagnostics", "pedagogical evaluation", "assessment", "verification", "accounting", "pedagogical measurement" and the others that are closely related to the above. It is proved that the assessment of the quality of professional training of specialists in the college should be carried out by comparing the students' demonstrated knowledge, skills, abilities and other competencies (current state of the object) with the reference (expected, standardized) results declared in the standards of professional pre-higher education (educational programs). The methodology for assessing the quality of professional training of specialists as an algorithm for the consistent implementation of nine stages – from the establishment of reference learning outcomes to the production of conclusions about the level of quality of competency-based learning of students. A method for assessing the formation of skills (other competencies) of students based on the description of the structural components of professional action (subject (object); process (procedure); means; conditions; result (product)) is proposed. Conclusions: The methodology for assessing the quality of professional training of specialists in colleges makes it possible to determine the real level of compliance of students' preparedness with the established regulatory requirements at all stages of mastering the educational program by applicants. The proposed method of assessing competencies (educational outcomes) on the basis of didactic differentiation of professional activities provides an opportunity for interested subjects of the educational process, no longer intuitively, but purposefully, on a scientific basis, to develop diagnostic tools, conduct diagnostic procedures and reliable results of testing students' competencies.*

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*Актуальність. Адекватне функціонування будь-якої педагогічної системи, зокрема і системи підготовки фахівців у коледжі, неможливе без зворотного зв'язку, без встановлення ефективності освітнього процесу, оцінювання результатів компетентнісно-орієнтованого навчання. Водночас педагогічною наукою ще не напрацьовано докладних теорій і валідних методик, які б давали змогу надійно оцінювати рівень опанування студентами професійними вміннями, навичками, іншими складними компетентностями, визначеними освітніми стандартами результатами навчання. З огляду на це, постала необхідність у розробленні*

надійної, системної і доступної у практичному застосуванні методики оцінювання якості підготовки фахівців у коледжах.

*Мета* – на основі аналізу сутнісних характеристик педагогічного оцінювання, особливостей компетентнісного підходу у фаховій передвищій освіті обґрунтувати методику оцінювання якості підготовки фахівців у коледжах.

*Методи*: теоретичні (теоретичний аналіз наукових джерел, вивчення вимог професійних і освітніх стандартів, освітніх програм, аналіз програм навчальних дисциплін – задля з'ясування стану проблеми дослідження та визначення напрямів наукового пошуку; порівняння – з метою вивчення наукових підходів щодо розв'язання проблеми; аналіз і синтез – для розроблення методу оцінювання компетентностей (освітніх результатів); емпіричні (спостереження, тестування – для визначення валідності інструментарію, внесення коректив у методику оцінювання; дидактичний експеримент – для визначення вагомості питань теми та виділення домінантних навчальних елементів).

*Результати*. Конкретизовано сутність педагогічного оцінювання як процесу встановлення рівня навчальних досягнень студента/студентів в оволодінні змістом навчальної дисципліни (теми, модуля та ін.) відповідно до унормованих вимог. Констатовано брак сталих підходів до визначення понять «педагогічний контроль», «педагогічний (освітній) моніторинг», «педагогічна діагностика», «педагогічне оцінювання», «оцінка», «перевірка», «облік», «педагогічне вимірювання» та інших, що тісно пов'язані з названими. Доведено, що оцінювання якості професійної підготовки фахівців у коледжі має здійснюватися шляхом зіставлення демонстрованих студентами знань, умінь, навичок, інших компетентностей (актуальний стан об'єкта), з еталонними (очікуваними, унормованими) результатами, задекларованими в стандартах фахової передвищої освіти (освітніх програмах). Обґрунтовано методику оцінювання якості професійної підготовки фахівців як алгоритм послідовної реалізації дев'яти етапів – від встановлення еталонних результатів навчання до продукування висновків про рівень якості компетентнісно-орієнтованого навчання студентів. Запропоновано метод оцінювання сформованості умінь (інших компетентностей) студентів на основі опису структурних компонентів професійної дії (предмет (об'єкт); процес (процедура); засоби; умови; результат (продукт)).

*Висновки*: Обґрунтована методика оцінювання якості професійної підготовки фахівців у коледжах дає можливість визначити реальний рівень відповідності підготовленості студентів встановленим нормативним вимогам на всіх етапах опанування здобувачами освітньою програмою. Запропонований метод оцінювання компетентностей (освітніх результатів) на основі дидактичного диференціювання професійних дій надає можливість зацікавленим суб'єктам освітнього процесу вже не інтуїтивно, а цілеспрямовано, на науковій основі розробити діагностичний інструментарій, провести діагностичні процедури й отримати об'єктивні, надійні результати перевірки компетентнісних досягнень студентів.

**Keywords:** professional pre-higher education, quality of professional training, pedagogical assessment, method of competence assessment, reference learning outcomes.

**Ключові слова:** фахова передвища освіта, якість професійної підготовки, педагогічне оцінювання, метод оцінювання компетентностей, еталонні результати навчання.

**Introduction.** Rapid changes in the techno sphere, the dynamic introduction of innovative technologies in all sectors of the economy necessitate a significant reform of the established system of training technicians, technologists, managers in institutions of professional pre-higher education. Modern normative educational documents indicate the need to significantly change the conceptual principles of organization of the educational process, where the personality of the student, his interests, needs, inclinations and preferences should be in the center. From a simple consumer of scientific and technical technological information, a performer of exclusively reproductive tasks of mastering future professional activity, the applicant has the main advantage to give away independent educational work, purposeful development of creative abilities and inclinations. That is why, modern professional education, in particular professional pre-higher education, is dynamically moving to the models of competence-oriented learning, which allow to train versatile, highly qualified, competitive professionals, capable of professional self-improvement, self-realization. At the same time, the control of students' competence achievements and objective assessment of the quality of their professional training become especially important.

Instead, the system of monitoring the learning outcomes of vocational education applicants, established for years, is based on outdated principles and methods, can not provide an authentic, reliable assessment of the quality of their training. The reasons for this negative phenomenon are due to the complexity of methodological (understanding of the essence of the quality of training specialists by the pedagogical community ), didactic (what principles, rules, conditions should be followed when assessing the quality of training technicians, technologists, managers, etc.), methodical (what methods, technologies, tools should be used to measure the level of quality of professional training of applicants for professional pre-higher education) problems.

It should be noted that pedagogical science has not yet developed detailed theories and valid methods that allow to reliably assess the level of students' mastery of professional skills, abilities, other complex competencies, defined by educational standards and learning outcomes. In

view of this, there is a need to develop a reliable, systematic and accessible, in practice, methodology for assessing the quality of training specialists in colleges.

**Sources.** It is worth noting that there are a number of regulations that contain references to models, procedures, and order for ensuring the quality of training specialists in colleges. In particular, the Law of Ukraine "On Education" specifically states that the quality of education is the compliance of learning outcomes with the requirements established by law, the relevant standard of education and / or the contract for the provision of educational services. Along with this concept, the quality of educational activities is defined as "the level of organization, provision and implementation of the educational process that ensures the acquisition of quality education and meets the requirements established by law and / or the contract for educational services." It is assumed that the assessment of learning outcomes (external, independent) should be carried out on the principles of validity (validity and suitability of assessment methods and technologies for specific purposes), openness and transparency, objectivity, reliability, accessibility, responsibility.

In turn, the Law of Ukraine "On Professional Pre-Higher Education" declares that the main criterion for the effectiveness of this educational unit is its quality – compliance of the conditions of educational activity and learning outcomes with the requirements of the legislation and the standards of professional pre-higher education. Section IV emphasizes the need to ensure the relevance, reliability, transparency and objectivity of the evaluation of the quality of educational activities.

The Concept of Quality Assurance in Higher Education, prepared as a result of the Tempus project "TRUST" "National system of quality assurance and mutual trust in the system of higher education of Ukraine", states that the development of quality concepts and national concept of quality assurance, value systems in accordance with the best European standards, increasing student motivation and the participation of all important stakeholders in quality assurance procedures are long-term goals that we must achieve in the future. At the same time, criticizing the "distorted and outdated system of values [...] aimed at controlling, pressuring and punishing those who do not meet the established criteria", specific indicators

and methods of assessing the quality of higher education are not mentioned here.

The scientific and theoretical principles of solving the problem of assessing the quality of training specialists in institutions of professional pre-higher education are the works of domestic scientists:

– methodological principles of ensuring and monitoring the quality of education were studied by V. Kremen (2014), V. Luhovyi (2010; 2016), N. Nychkalo (2002), J. Talanova (2010; 2016), O. Sliusarenko (2010; 2016), A. Stavytsky (2016), V. Stavytskyi (2016), E. Khrykov (2018); G. Tsekhmistrova (2005); O. Lokshyna (2004), O. Liashenko (2007; 2012), S. Babinets (2019), V. Bobrytska (2015), S. Kretovych (2012), I. Bulakh (2006; 2020) substantiated the theoretical bases of assessing the quality of vocational education;

– methodological bases of monitoring and evaluation of the quality of training specialists were covered by P. Luzan (2012), L. Iaroshchuk (2010), A. Kalenskyi (2012), N. Vanina (2012), I. Mosya (2012), T. Pashchenko (2012), V. Cheshuk (2010), L. Yurchenko (2012) and others.

The results of modern research of such Doctors of Sciences as (Yu. Dutchak (2021), G. Krasylnykova (2015; 2016), I. Hyrylovska (2021) are of particular importance for solving the problem of assessing the quality of professional training of specialists in colleges. It is also worth noting the monograph "Methods of test control of student achievement" (Ilin, Luzan and Rudyk, 2010), where the authors, using the theory of formation of mental actions and concepts, propose to assess students' skills by means of test methods.

Despite the number of scientific investigations of problems in monitoring the educational process and diagnosing student achievement, we must state that the development and substantiation of detailed methodology for assessing the quality of training specialists in institutions of professional pre-higher education, although has been intensified recently in connection with the National Qualifications Agency, National Agency for Quality Assurance in Higher Education, but has not yet received adequate coverage.

**The research aims** to substantiate the methodology (for assessing the quality of training specialists in colleges) on the basis of the analysis of

essential characteristics of pedagogical estimation, features of the competence approach in professional pre-higher education.

**Methods:** theoretical (theoretical analysis of scientific sources, study of the requirements of professional and educational standards, educational programs, analysis of programs of academic disciplines – to clarify the state of the research problem and determine areas of scientific research; comparison – to study scientific approaches to solving the problem; analysis and synthesis – to develop a method for assessing competencies (educational outcomes), empirical (observation, testing – to determine the validity of tools, making adjustments to the assessment methodology; didactic experiment – to determine the importance of the topic and highlight the dominant learning elements).

**Results and discussion.** The problem of the quality of professional pre-higher education is decisive in the search for effective forms and technologies of teaching, methods of selection and structuring of competency-oriented educational content, conditions for creating information and educational environment of the college by both scientists and teachers-practitioners. Instead, scientists do not demonstrate a unity of opinion on the meaning of "quality of education", so today there are several hundred definitions of this phenomenon in widespread use. Most often, scientists understand the quality of education (Yaroshchuk, 2010, p. 12) as:

- compliance of learning outcomes with the requirements of the educational standard;
- efficiency of the educational institution;
- the result of the educational process;
- the effectiveness of the education system of a certain level or industry;
- priority of state educational policy.

It is worth supporting the opinion of R. Kubanov (2014) that the concept of "quality of training" arose as a result of narrowing the concept of "quality of education (professional pre-higher, higher)". Without dwelling on a detailed analysis of this term, we point out that in our study, the quality of training specialists means the compliance of learning outcomes with the requirements of the standards of professional pre-higher education and educational and professional programs.



Naturally, the adequate functioning of any pedagogical system, including the system of training specialists in college, is impossible without feedback, establishing the effectiveness of the educational process, the results of competency-based learning. Therefore, it is extremely important to objectively, reliably and systematically assess the quality of training of future technicians, technologists, managers, foremen, etc. The question rightly arises: how, by what methods, tools, by what criteria and indicators should the quality of professional training of such specialists be assessed? First of all, let us turn to the essential characteristics of pedagogical assessment and related didactic categories.

We will note that in the works known to us there are no sustainable approaches yet to definition of concepts "pedagogical control", "pedagogical (educational) monitoring", "pedagogical diagnostics", "pedagogical assessment", "assessment", "check", "accounting", "pedagogical measurement" and the others that are closely related to the above. Very often they are mixed, used as synonyms, and, sometimes, in different meanings. This is one of the factors that in the training of specialists in colleges control does not fully perform its basic functions, weakly contributes to the productive independent work of students. In addition, not all pedagogical and scientific-pedagogical workers have sufficient psychological and pedagogical bases for the organization of systematic, comprehensive, developmental, objective and impartial control of students' competence achievements.

Most often, pedagogical (educational) monitoring (Latin monitor one that reminds, supervises, stores) means a specially created system of collecting, processing, storing and disseminating information about the state of education, forecasting on the basis of objective data on the dynamics and main trends of its development and the development of scientifically sound recommendations for making management decisions to improve efficiency of functioning of a certain educational branch. E. Khrykov (2018) defines, rightly, pedagogical monitoring as a system of measures for collecting and analyzing information in order to study and assess the quality of training and decision-making on the development of the educational process based on the analysis of typical features and trends. A component of educational monitoring is pedagogical diagnostics – division of pedagogy that studies the

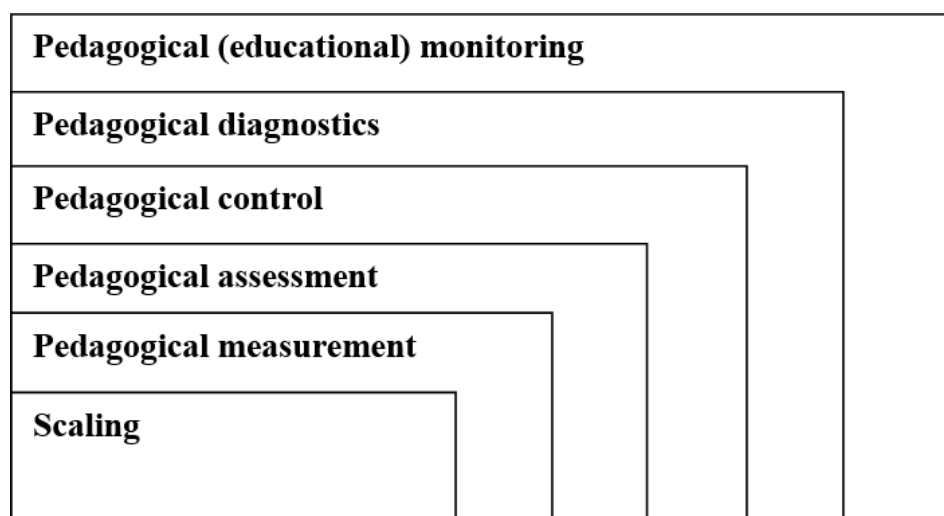
principles and methods of recognition and establishment of features that characterize the normal or deviant course of the educational process. The essence of pedagogical diagnostics should be understood as a holistic set of structural (purpose, pedagogical diagnosis, methods, objects, subjects of diagnostics) and functional (tasks, types, functions, principles) components that are closely interrelated. Thus, pedagogical diagnostics includes control, verification, accounting, evaluation, analysis of statistical data, detection of dynamics of changes, clarification, adjustment of curricula, forecasting.

Control of learning outcomes plays an extremely important role in the system of competence-oriented training of future specialists. This is primarily due to its objectives (Fitsula, 2006): determining the quality of students' assimilation of educational material, the degree of conformity of skills and abilities to the goals and objectives of the subject; identifying students' readiness to perceive, understand and assimilate new knowledge; obtaining information about the nature of independent work in the learning process; determining the effectiveness of organizational forms, methods and tools of teaching; finding out the degree of correctness, volume, depth of students' acquisition of knowledge, skills and abilities.

We considered the definition of pedagogical control, which M. Fitsula (2006) substantiates. This is a didactic tool for learning management, aimed at ensuring the effectiveness of the formation of knowledge, skills, abilities, their use in practice, stimulating students' learning activities, the formation of their desire for self-education.

The result of the control should be an assessment that involves comparing what students have learned with what they had to learn in accordance with the requirements of the educational-professional program (educational standard). Thus, pedagogical assessment is the process of establishing the level of student achievement in mastering the content of the discipline (topic, module, etc.) in accordance with the requirements of current educational and professional programs. At the same time, pedagogical measurement is used as a specific procedure of quantitative comparison of the studied feature with a certain standard, taken as a unit of measurement. We add that the set of measurement methods for evaluating the obtained information is called scaling.

In our opinion, pedagogical assessment as a category of didactics is correlated with similar related concepts, as shown in Figure 2.5.



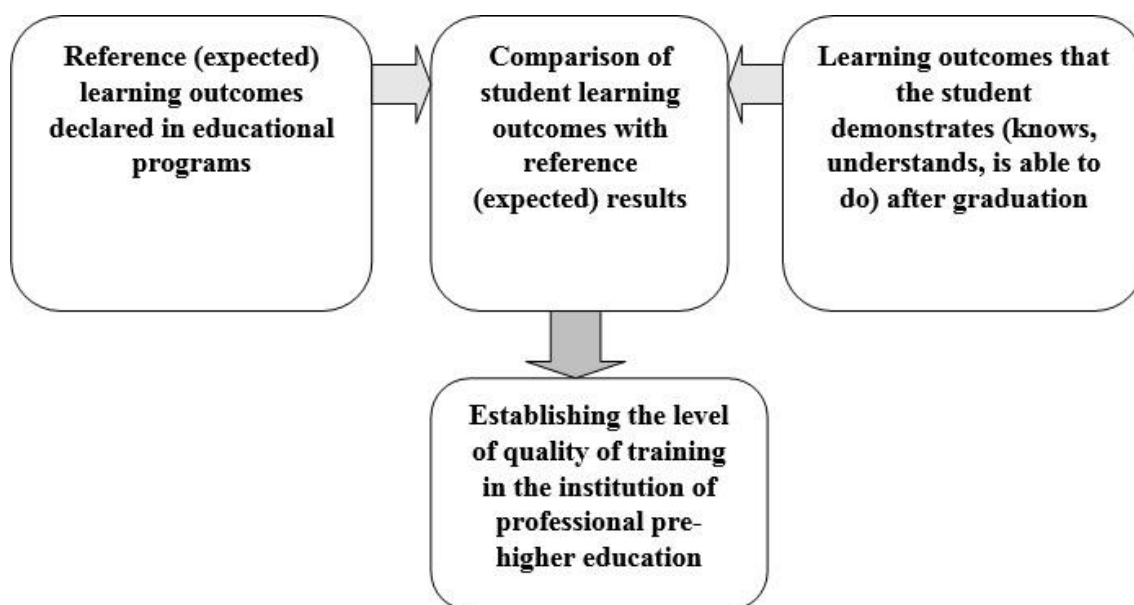
*Note. Created by the author.*

*Figure 2.5. The scheme of subordination of concepts related to the term "pedagogical assessment"*

Thus, the main criterion for the effectiveness of professional training in colleges is the quality of education – compliance of educational conditions and learning outcomes to legal requirements and educational standards, professional and / or international standards (if any), and the needs of interested parties and society. Let us remind ourselves that in terms of the new competency methodology, educational outcomes are a set of knowledge, skills, abilities and other competencies declared in educational standards, which must be mastered by a person in the process of studying according to the particular educational program, and which can be identified, quantified and measured.

Thus, the reference learning outcomes are the program learning outcomes declared in a particular educational program. In turn, the set of knowledge, skills, abilities and other competencies acquired by a person in the process of learning, according to a certain educational program, are real, educational results. Thus, the basis of the assessment procedure is to compare the students' demonstrated knowledge, skills, abilities and other competencies (current state of the object) with the reference (expected,

normalized) results and establish an objective level of quality of training specialists in college (Figure 2.6).



*Note.* Created by the author.

*Figure 2.6. Model of the procedure for assessing the quality of training specialists in colleges*

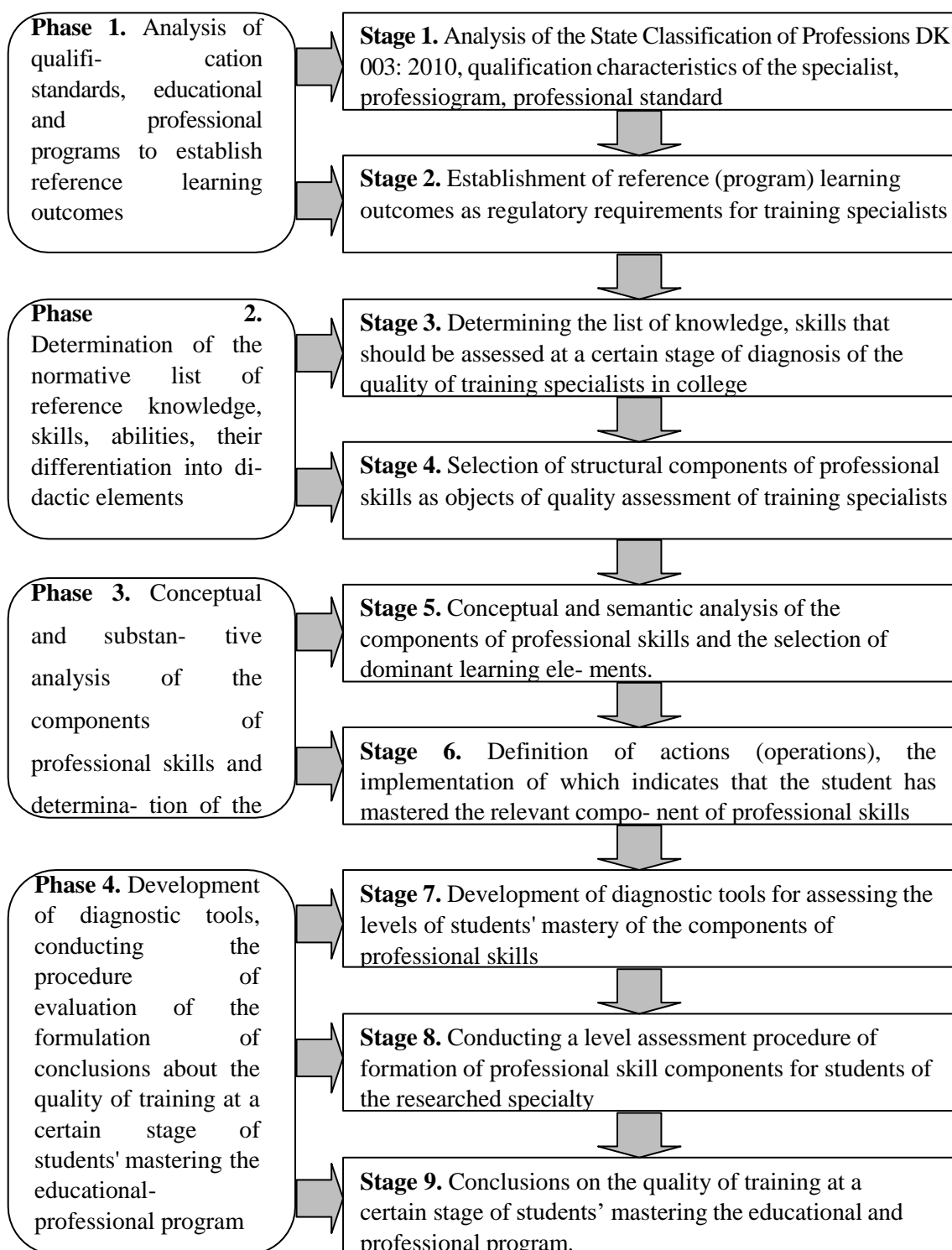
In the scientific literature, scientists associate the essence of the process of pedagogical evaluation mainly with the systematic collection and interpretation of data, producing judgments (based on them) to organize certain actions to improve the system. At the same time, informational (collection of information about a student, student group, specialty, etc.), interpretive (establishing the degree of formation of knowledge, skills, individual personality traits, the level of student cohesion, the state of engineering education, etc.) and corrective (making certain changes in the educational process, optimization of methods, forms, technologies of teaching and education, providing methodological assistance to the subjects of pedagogical interaction, etc.) functions of assessing the learning outcomes of students (Liashenko et al., 2012). In the scientific literature, scientists associate the essence of the process of pedagogical evaluation mainly with the systematic collection and interpretation of data, producing judgments (based on them) to organize certain actions to improve the system. At the same time, informational (collection of information about a student, student group, specialty, etc.), interpretive (establishing the degree of formation of knowledge, skills, individual personality traits, the level of student cohesion,

the state of engineering education, etc.) and corrective (making certain changes in the educational process, optimization of methods, forms, technologies of teaching and education, providing methodological assistance to the subjects of pedagogical interaction, etc.) functions of assessing the learning outcomes of students (Liashenko et al., 2012). It is worth agreeing with the recommendations of scientists that pedagogical assessment can be used for various purposes: to determine the academic achievements of students; to establish the effectiveness of methods and forms of training; to determine the effectiveness of activities of the educational institution; to determine the effectiveness of a substantiated way of learning, didactic technology, etc. In our case, we will focus on evaluating "for the purpose of development, improvement and refinement (for improvement)" of the results of students' competency achievements – their professional training.

In view of the above, we believe that assessing the quality of professional training in colleges should be considered as a logical structure that hierarchically combines four stages with the appropriate stages (Figure 2.7).

**Stage 1.** *Analysis of the State Classification of Professions DK 003: 2010, qualification characteristics of the specialist, professiogram, professional standard.* At this stage, the provisions of the classifier of professions, professional standard, qualification characteristics, etc. regarding the functions, labor actions, general and special competencies of the graduate, requirements for his professional qualities and the others are analyzed.

**Stage 2.** *Establishment of reference (program) learning outcomes as regulatory requirements for training specialists.* Using the content of professional, educational standards (if any), educational and professional training program, we write out the educational results that must be demonstrated by applicants for a particular specialty at the stage of state certification. For example, Table 2.7 shows the general program learning outcomes that graduates must demonstrate at the end of mastering the educational and professional training program for technicians in the operation and repair of equipment (specialty 133 "Industrial Engineering").



Note. Created by the author.

Figure 2.7. The structure of the methodology for assessing the quality of training specialists in colleges

In particular, such learning outcomes in the profile of the educational-professional training program 19: from «1. Ability to communicate in the state language on professional issues" to "19. Skills to work on drilling

machines: to perform drilling, deployment, countersinking on single and multi-spindle machines".

**Stage 3.** *Determining the list of knowledge, skills that should be assessed at a certain stage of diagnosis of the quality of training specialists in college.* At this stage, the reference learning outcomes are specified depending on the objectives of assessing the quality of training specialists. For example, after mastering the discipline "Fundamentals of Economic Theory", the future technician should be able to: evaluate indicators of efficiency of functioning of the technological equipment and systems and develop measures to optimize their work: to analyze technical and economic indicators of design solutions in the field of tool production; to analyze economic phenomena, processes and action of economic laws in society. We will remind: that learning outcomes are a kind of indicator of a student's gradually acquired competencies and are formulated by pedagogical staff at the level of the educational program and a separate discipline / module. In the mentioned educational-professional program the results which the student should show on completion of mastering of bases of the economic theory are formulated in such edition: "Ability, working under the guidance of leading experts, to carry out tool cost calculations, the price and economic efficiency of its implementation, the complexity of the planned production volume and the amount of necessary equipment and salary". This skill is reference in assessing the quality of student mastery of the basics of economic theory. We have to demonstrate a similar logic when assessing the quality of training of technicians for the operation and repair of equipment when mastering a particular module or topic of the course.

**Stage 4.** *Selection of structural components of professional skills as objects of quality assessment of training specialists.* The reference educational results (skills, abilities) defined for estimation are directed on performance of certain professional actions. By means of didactic differentiation, we distinguish the structural components of professional action in the following order: subject (object); process (procedure); means; conditions; result (product) (Ilin, Luzan and Rudyk, 2010).

Table 2.7

General program learning results in the specialty 133 "Industrial Engineering"  
(Qualification 3117 technicians for operation and repair of equipment)

No	Learning outcomes
1	Ability to communicate in the state language on professional issues
2	Ability to perform technical drawings using a single system of technological (SSTD) and design documentation (SSDD) with the use of modern computer tools: detailing and assembly units
3	Ability, working under the guidance of leading specialists, to perform calculations of the cost of the tool, the price and cost-effectiveness of its implementation, the complexity of the planned production volume and the amount of necessary equipment and salary
...	.....
16	Ability to work on lathes. Be able to perform: machining of workpieces on universal and specialized lathes, external and internal threads on lathes
17	Ability to work on milling machines: perform milling of workpieces of medium complexity for machine parts and tools on different types of milling machines
18	Ability to work on grinding and sharpening machines: grinding parts on different types of grinding machines, sharpening cutters and drills
19	Ability to work on drilling machines: perform drilling, deployment, countersinking on single and multi-spindle machines

The description of the structural components of each skill should be as detailed as possible so that there is no discrepancy in the definition of: the subject of action, its components and features; the content and sequence of operations that are part of the action; devices and tools that must be used during the action; the conditions under which the action must be performed; the results to be evaluated and achieved as a result of the action. We use the following rule: we can tell about the formation of a certain professional skill when the student can with regard to: the subject (object of action) – recognize (choose) the desired object from the available or name its specific features; process (procedure) – name the operations provided by the procedure and indicate their sequence or perform practical operations on the provided object; means – name necessary means, devices, tools, the equipment, select necessary means, show ability to use the necessary devices or tools; conditions – name the conditions necessary for performance of action, define



sufficiency of available conditions for performance of operations; result (product) – on the basis of available signs, make a conclusion about the conformity of the result obtained as a result of professional action, established by the requirements.

For example, we give a method of selecting the structural components of the professional skills of future technicians for the operation and repair of equipment "The ability to perform internal threading on lathes". We characterize the main structural components of the relevant professional action – to perform internal threading on lathes. Thus, we will carry out the analysis in the context of structure of professional action in the following order: concepts (categories; terms; definitions; designations); phenomena (properties; phenomena; facts; signs; description of objects, mechanisms; systematics); relations (ratio; theorems; laws; concepts; rules; hypotheses; physical and mathematical models; dependencies – analytical, graphical, logical; structures, etc.).

Thus, the subject (object) of the specified professional action is: threaded connection; carving; thread classification; threaded surface elements; ways to control the thread; thread systems; designation of a carving surface; internal thread cutting; tap; the device for fastening of a tap.

Process: the procedure of performing internal threading on a lathe consists of the following operations (Baz and Zakharenko, 2020):

1. Determination of the diameter of the hole by the formula:

$$PHD = TD - TP, mm,$$

where *PHD* – diameter of the hole for cutting, mm; *TD* – thread diameter, mm; *TP* – thread pitch, mm.

2. Drilling of the hole (socket) and chamfering;
3. Installation of workpiece in the lathe chuck
4. Preparation of the surface for threading;
5. Insertion of the tap into the hole of the intake part and fixing the tail part in the appropriate device;
6. Installation of a conic shaft of a mandrel in the hole of the quill of the rear headstock;
7. Cutting the thread with a tap to a certain length;
8. Thread control.

Means: formula for determining the diameter of the hole ( $PHD = TD - TP$ , mm); lathe 1K62; drill; through-turning lathe; tap; the device for fastening of a tap; threaded caliber plug.

Conditions: 1. Drilling a hole in a steel billet is carried out with cooling; 2. With increasing and decreasing hardness (strength) of the processed material, the tabular values of speed must be reduced or increased, but not more than 30%; 3. When the depth of the hole is more than three of its diameters, the feed is reduced by 10-30%, and the cutting speed – by 20-50%; 4. It is expedient to perform a single manufacture of chamfer parts with a combination of transverse and longitudinal feeds of the cutter; 5. The workpiece is installed and fixed in the chuck so that the axis of the hole of the part coincides with the axis of rotation of the spindle. 6. To cut the first turns of the thread, you need to gently and evenly press on the tap, rotating the handwheel of the rear headstock. When the tap crashes into the hole for 1-1.5 turns, its further movement will be self-tightening due to the rotation of the part. 7. Before you cut the thread in the blind holes, you must remove the chips. 8. To prevent thread breakage, it is necessary to choose the correct diameter of the hole, use taps with sharp cutting edges and clean them more often from chips.

Result: cut thread of a certain length with allowable parameters (thread pitch; average diameter, half of the profile angle, as well as inner and outer thread diameters) without defects (tap failure in the hole; torn thread; incomplete thread; thread failure).

*Stage 5. Conceptual and semantic analysis of the components of professional skills and the selection of dominant learning elements.* Naturally, it is extremely difficult to assess the student's formation of all educational elements of one or another component of professional action. To determine the basic, dominant learning elements, we must first analyze these elements from the following positions: with what probability can we say that, demonstrating knowledge of a particular element, the student knows other, slightly simpler components? It will be better if such conclusions are made by an expert group.

Obviously, the elements of knowledge are not always combined with each other: sometimes it is impossible to say that if a student has mastered some concepts, he has mastered others on this topic. However, very often,

the training material is connected in the following order: in order to master a certain topic, a certain issue or term, it is necessary to know the previous material. In other cases, the above dependence is less severe: the student can thoroughly master a certain issue of the topic, and not to own the material at all on other issues of the same topic. For example, mastering the topic "Machines for sowing" (discipline "Agricultural Machinery"), future agricultural specialists must master the material on the following issues: 1. Purpose and classification of seeders; 2. General structure and technological process of grain seeder operation; 3. Beet seeders, their structure, operation, regulation; 4. The structure and operation of the corn drill. It is quite obvious that when a future agricultural engineer demonstrates excellent knowledge of the structure, technological process, operations of grain drill adjustment, the student must have knowledge of the purpose and classification of drills in general. But he may not have knowledge of the structure, operation and regulation of beet or corn drills. To control the system of such knowledge, scientists recommend using the probabilistic method (Polonskyi, 2018). Here we are talking about the fact that you can test a system of knowledge with the help of questions, the answers to which are most likely to indicate that students have mastered the entire system of this knowledge. Such questions are selected according to their diagnostic weight, which is experimentally defined as the fraction of the number of students who correctly answered all questions on a given topic (section, module, etc.), the number of students who correctly answered a question or group of questions. It is not difficult to notice that, in fact, the diagnostic weight of the question is actually always less than 1. To implement the probabilistic method of knowledge assessment, the following steps are proposed:

1. To define the purpose of control.
2. To make the list of tasks, questions, the answers to which testify about mastering the whole amount of knowledge, skills, abilities.
3. To determine empirically the frequency of correct answers to each question or a group of questions.
4. To calculate the diagnostic weight of a question or a group of questions.
5. To control the system of knowledge on issues with the greatest diagnostic weight.

We consider it necessary to present the data of the didactic experiment, which illustrates the application of the probabilistic method of knowledge control (Table 2). The experiment involved 100 students – future mechanical technicians of agricultural production (specialty 208 "Agricultural engineering"). Assimilation of educational material from the course "Agricultural Machinery" (topic "General purpose plows") was checked. According to the structure of the content of the study of agricultural machinery, respondents were asked 9 questions – from the purpose of this agricultural machine to technological adjustment and regulation. Evaluation was performed by means of testing.

Table 2.8

Determining the diagnostic importance of the topic "General purpose plows" (discipline "Agricultural Machinery", specialty 208 "Agricultural engineering")

<b>№</b>	<b>Questions on the topic "Machines for the main tillage "</b>	<b>The number of students who answered the questions correctly</b>	<b>Diagnostic significance of the issue</b>
1	The purpose of the plow	98	0.20
2	Agrotechnical requirements for plowing	96	0.21
3	Classification of plows	88	0.23
4	Technical characteristics of the general purpose plow	78	0.26
5	The general structure of a ploughshare	80	0.25
6	Structure and purpose of plow working bodies	47	0.42
7	Plow working process	50	0.40
8	Operations performed by the components of the plow	48	0.41
9	Technological adjustment and regulation of a ploughshare	30	0.66
10	All questions of the topic	20	-

Analysis of student test results shows that each of the 9 questions of the topic has a different weight. In particular, out of the total number of respondents, 20 people answered all 9 questions correctly. Almost all students answered the first and second questions of the topic correctly (Purpose of the plow – 98 people; Agrotechnical requirements for plowing – 96 people). In addition, 88 respondents performed control tasks on the

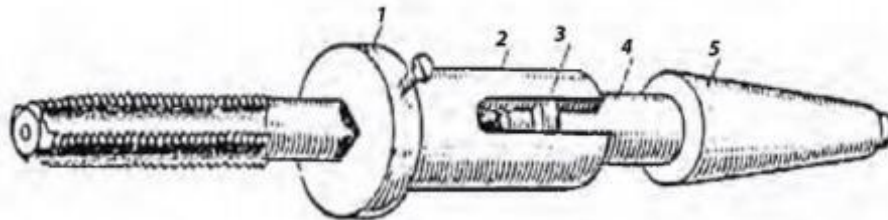
classification of plows correctly, respectively 78 – the technical characteristics of the general purpose plow, 80 – the general structure of the ploughshare. On the other hand, this does not mean that with the help of these five questions it is possible to check the mastering of the material of the whole topic: the correct answers to the ninth, sixth, eighth, seventh questions of the topic were demonstrated by a much smaller share of students.

Obviously, if a student answers these "difficult" questions, then the highest probability of testing knowledge on the whole topic is achieved. We mean a hypothetical statement: if a student demonstrates the correct answers to the ninth, sixth, eighth, seventh question of the topic, then with a high probability (more than 90%) we can say that he has mastered the whole content of the topic. We support the reasoning with the following example: if a student solves the problem of determining the volume of a triangular pyramid correctly, he can determine the area of the triangle (to calculate the volume of the pyramid you need to determine the area of the base – the triangle – and multiply it by a third of the height).

Let's try to apply a similar logic of selection of dominant training elements for the professional action "Performance of internal threads on lathes". Note that we have identified 10 didactic elements that define the subject (object) of the specified professional action. Among such educational elements as "threaded connection", "thread", "thread classification", "threaded surface elements", in our opinion, the last one is the most important: if the student has mastered the parameters of the threaded surface ( $P$  is the thread pitch;  $H$  is the V-form height;  $t$  is the thread height;  $d$  – the major diameter;  $d_{av}$  – is the pitch diameter  $d_1$  is the minor diameter;  $\varepsilon$  – the angle of the thread profile), then with high probability we can say that our imaginary student knows: the thread is "... a helical groove of a certain profile, which is cut on a cylindrical or conical surface"; the thread can be left-right (in the direction of the helix), single-start – multi-start (by the number of ridges), outer – inner (by location), triangular, trapezoidal, rectangular, stubborn, round (by profile shape), etc. Among the other educational elements that determine the subject (object) of the studied professional action, the dominant ones are: devices for fixing the tap (Figure 2.8); designation of a carving surface. Note that the training element "device for fixing the tap" contains the following information: "The device for fixing

the tap consists of a mandrel with a key and a sleeve with a groove, which includes the key. The tap is fixed with two bolts in the square hole of the sleeve. The mandrel has a conical shank that is inserted into the hole of the quill of the rear headstock". It is not difficult to notice that during mastering of this didactic element, our imaginary student should know (understand, figuratively imagine) the tool of cutting of an internal carving – a tap. At the same time, imagining this way of threading, knowing its functions and design features, the learner may not know the design of the device for fixing the tap.

A similar analysis must be performed in determining the dominant didactic elements for the other components of professional action.



*Note. Created by the author.*

*Figure 2.8. Device for fixing the tap on the lathe:*

*1 – sleeve with a square hole; 2 – bushing; 3 – key; 4 – mandrel; 5 – adapter sleeve*

**Stage 6.** *Definition of actions (operations), the implementation of which indicates that the student has mastered the relevant component of professional skills.* To assess the formation of certain professional skills, it is necessary to prescribe operations, the implementation of which should certify the student's mastery of all components of professional action. For example, to assess the formation of the ability to perform calculations, the student has to:

- characterize the object of calculation (the value that is determined during the calculation);
- name the conditions under which the calculation is made;
- give definitions of concepts used during the calculation;
- name the values (parameters) used in the calculation;
- determine the formulas used in the calculation;
- make a calculation.

The separation of operations to assess more complex professional skills is also carried out by means of analysis of structural components of

action. For example, to assess the ability of students to set sowing machines for grain drills to the seeding rate (discipline "Agricultural Machinery") we should make sure that they are able to:

- determine the parameters, the change of which affects the seeding rate;
  - determine the nomogram length of the coil and the speed of rotation of the coil drive shaft;
  - name and show the structural components of the coil sowing machine;
  - show the sequence of transmission from the axis of the wheels to the shaft of the actuator (drive) of the sowing machines on the gearbox;
  - name the parameters that are regulated during the establishment of the seeding rate;
  - characterize the changes that occur in the seeding machine during the regulation of the seeding rate;
  - characterize the changes that occur in the gearbox during the adjustment of the seeding rate;
  - name the content and procedure for performing operations to verify the established seeding rate;
  - calculate the sowing rate set for the drills according to the values of the number of seeds sown during the test;
  - control the performance of the drill in accordance with agrotechnical requirements.

**Stage 7.** *Development of diagnostic tools for assessing the levels of students' mastery of the components of professional skills.* This stage aims to develop control tasks, tests, expert letters, other means of assessing student achievement according to established criteria (1. Characteristics of student response; 2. Quality of knowledge; 3. Degree of skills; 4. Level of mastery of cognitive operations; 5. Experience of creative activity). Methodological aspects of developing diagnostic tools for assessing the levels of students' acquisition of knowledge, skills, abilities and other competencies can be a problem of independent research.

**Stage 8.** *Conducting a level assessment procedure of formation of professional skill components for students of the researched specialty.*

When assessing student achievement, it is necessary to follow certain rules, which are based on the provisions of modern theory of control of learning outcomes. We are talking, in particular, about the observance of the following principles:

- a positive approach in assessing student learning outcomes. Valuation as a result of assessment should focus on the level of achievement and progress of the student, not to emphasize his failures: only such an approach provides a real, stimulating impact on the development of educational and cognitive activities of the student, his attitude to learning;
- individual approach when assessing the results of students' academic achievements – providing such didactic conditions under which psychological stress, students' anxiety for the objectivity of their knowledge assessment are removed, an atmosphere of friendliness is created, and fair assessment stimulates each student to systematic educational and cognitive activities, elimination of identified shortcomings.

***Stage 9. Conclusions on the quality of training at a certain stage of students' mastering the educational and professional program.***

Based on the results of the examination of students' competence achievements, a conclusion is made on the compliance of the preparedness of students (graduates) with the regulatory requirements. Naturally, the objectivity of the conclusions depends on the provision of certain didactic conditions for assessing the quality of professional training, which include:

- purposeful application of valid, reliable, accurate methods of objective assessment of student achievement;
- the use of several tools for assessing (scientists call from 2 to 4) the quality of training specialists (testing, observation, project, practical task, discussion, presentation, interviews, role-playing games, etc.), each of which is the most adequate to assess the relevant object being diagnosed (component of professional competence – professional knowledge, skills, attitudes, personal qualities, etc.);
- tools for assessing the quality of training should be relevant to the objects of assessment and the characteristics of students;
- production of conclusions about the quality of training is carried out on the basis of the triangulation method of improving reliability – taking



into account information from various sources, including self-assessment of students and peer assessment of classmates;

– acquaintance of students, in advance, with the criteria for assessing the quality of their training in institutions of engineering and technical education.

It is important to emphasize that the effectiveness of assessment of knowledge, skills and abilities, the reliability and the validity of testing methods depend almost entirely on the individuality of the teacher, his experience, professional competence, psychological and pedagogical erudition, pedagogical techniques and tact. Therefore, research of possibilities of the scientific approach to pedagogical estimation, especially concerning its objectification is of great interest. Factors such as the choice of the most effective forms and methods of testing and assessing knowledge, skills, efficiency of tactics of knowledge diagnosis, the choice of formal evaluation criteria and statistical analysis of control results, conclusions and decision-making are important. Each of the factors is an independent problem that requires in-depth analysis and study.

The proposed methodology for assessing the quality of professional training of engineering and technical specialties was tested during 2010-2020 on the basis of the Tavriya State Agrotechnological University named after Dmytro Motorny and the National University of Life and Environmental Sciences of Ukraine. With the help of the methodology, tests and control tasks were developed to assess students' academic achievements both in the course of mastering the educational and professional program and for the final certification, which had a positive impact on the quality of professional training of future agricultural engineers.

**Conclusions.** The substantiated methodology for assessing the quality of professional training of specialists in colleges makes it possible to determine the real level of compliance of students' preparedness with the established regulatory requirements at all stages of mastering the educational program by applicants. The proposed method of assessing competencies (educational outcomes) on the basis of didactic differentiation of professional activities provides an opportunity for the interested subjects of the educational process, not intuitively, but purposefully, on a scientific basis to develop diagnostic tools, conduct diagnostic procedures and obtain

objective, reliable results of testing students' competencies. Prospects for further scientific research are associated with the development of a methodological system for evaluating the results of competencybased training of future specialists in agricultural specialties.

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## 2.4. APPROBATION OF TEST TASKS AND ANALYSIS OF THEIR QUALITY FOR NON-STANDARDIZED TESTS

### *АПРОБАЦІЯ ТЕСТОВИХ ЗАВДАНЬ ТА АНАЛІЗ ЇХНЬОЇ ЯКОСТІ ДЛЯ НЕСТАНДАРТИЗОВАНИХ ТЕСТІВ*

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*Relevance. The issue of enhanced quality of professional junior bachelors training provides for a significant improvement in the control of student learning outcomes as an important means of educational process management. By means of pedagogical control, it is possible to discover the level of knowledge of graduates and obtain information about the state of students' knowledge in the educational process. The systematic feedback is provided through monitoring that enables to create an adaptive competence-oriented training program and in a timely manner correct activities of teachers and students in the educational process. Test control of knowledge as a method of measurement and assessment of knowledge, abilities and skills of a student most fully meets the requirements of legislation in the field of education to ensure relevance, transparency, reliability and objectivity of assessment of learning outcomes.*

*The purpose of this research is to highlight the methods of approbation of test tasks and analyze their quality for non-standardized tests.*

*Methods: of the theoretical analysis – to study existing approaches to the methodology of test development, test tasks and quality control of test tasks; expert evaluation – to determine the correct wording of test tasks and accuracy of the questions, time limit for fulfilling test tasks; approbation (pilot test) – to test the developed tools; Pearson correlation coefficient – to determine the correlation coefficient of task scores with the test total score. Results: the concepts "test" and "test control" were defined, and the difference between standardized and non-standardized tests was determined, the specifics of expert evaluation of test effectiveness and its verification in the educational process in the context of trial testing was described, the algorithm for analysis of the test quality was revealed, the main indicators for selection of tasks for non-standardized tests and their calculation were singled out.*



*Conclusions. The research deals with approbation of non-standardized tests, their expert checks for correctness of the wording of the task, the accuracy of the wording of the questions, conditions for the implementation of trial testing; criteria for the selection of test tasks: the complexity potential; the variance of scores; the correlation coefficient of the task scores with the total test score. The further research will be focused on conducting a special experiment to create standardized tests, namely: check for reliability and validity based on a representative sample.*

*Актуальність. Питання підвищення якості підготовки фахових молодших бакалаврів передбачає значне поліпшення контролю результатів навчання студентів як важливого засобу управління освітнім процесом. За допомогою педагогічного контролю розкривають рівень знань випускників та отримують інформацію про стан знань студентів у освітньому процесі. Шляхом контролю здійснюється систематичний зворотний зв'язок, що дає змогу будувати адаптивну компетентісно орієнтовану програму навчання та своєчасне коригування дій викладачів і студентів у освітньому процесі. Тестовий контроль знань як метод вимірювання й оцінювання знань, умінь та навичок студента найбільш повно відповідає вимогам законодавства у сфері освіти щодо забезпечення релевантності, прозорості, надійності та об'єктивності оцінювання результатів навчання.*

*Мета: висвітлення методики апробації тестових завдань та аналіз їхньої якості для нестандартизованих тестів.*

*Методи: теоретичного аналізу – для дослідження існуючих підходів до методики розроблення тестів, тестових завдань та перевірки якості тестових завдань; експертної оцінки – для визначення правильності формулювання тестових завдань, точності запитань і терміну виконання тестових завдань; апробація (пілотажне дослідження) – для перевірки розробленого інструментарію; коефіцієнта кореляції Пірсона – для визначення коефіцієнта кореляції балів завдання із сумарними балами тесту.*

*Результати: розкрито зміст понять "тест" та "тестовий контроль", визначено відмінність між стандартизованими та нестандартизованими тестами, охарактеризовано особливості здійснення експертної оцінки ефективності тесту та його перевірки в освітньому процесі в рамках пробного тестування, розкрито алгоритм аналізу якості тесту, визначено основні показники відбору завдань для нестандартизованих тестів та їх розрахунок.*

*Висновки: У підрозділі розглянуто апробацію нестандартизованих тестових завдань, їх експертну перевірку на правильність формулювання завдань, точність формулювання запитань, умови здійснення пробного тестування; критерії відбору тестових завдань: потенціал складності; дисперсію балів; коефіцієнт кореляції балів завдання із сумарними балами тесту. Подальшими напрямками розвідок є робота з проведення експерименту для створення стандартизованих тестів, а саме: перевірка надійності та валідності на основі репрезентативної вибірки.*

**Keywords:** test control, testing, test, test task, validity, reliability, complexity, variance of scores, correlation coefficient.

**Keywords:** subjects of public-private partnership, managerial competence, professional (vocational) education, experiment.

**Introduction.** The quality of specialist training is compliance of learning outcomes in institutions of professional pre-higher education with legislation standards and requirements as well as the needs of employers and society. This quality is provided by external and internal education quality assurance systems of professional pre-higher education. According to the Law of Ukraine "On professional pre-higher education", one of the objectives of the internal education quality assurance system is to ensure the relevance, transparency, reliability and objectivity of assessment of learning outcomes.

The implementation of test control in the process of student knowledge assessment can meet the above requirements. However, the pedagogical practice shows that single-level tasks prevail in the structure of tests developed by teachers, the tests are developed without check for validity, reliability, and so on. Therefore, it can be noted that specific methodological recommendations are needed for construction of the pedagogical test and test tasks.

Sources. The issue of using tests in the educational process is not a new one. Many domestic and foreign scientists studied the issue of test control of student academic achievements. In particular, the theoretical and methodological aspects of test control were covered in the works of V. Avanesov, I. Bulakh,

V. Bezpalko, V. Bocharnikova, N. Huliukina, V. Ilin,

P. Luzan, E. Luzik, A. Maiorov, L. Morska,

I. Romaniuk, L. Parashchenko, I. Pidlasyi, M. Chelyshkova, J. Fischer and others. The various forms of pedagogical tests and test tasks, recommendations for their use, principles and requirements for compilation of these tests are dealt with in these works. But despite there is a significant number of works dedicated to test control, the issue of test control methodology was not studied enough, in particular, there are no works that could justify detailed approaches to the construction of multi-level test tasks, and there is no methodology available for the average teacher to check test tasks and the test as a whole for validity.

Methods: of the theoretical analysis – to study existing approaches to the methodology of test development, test tasks and quality control of test

tasks; expert evaluation – to determine the correct wording of test tasks and accuracy of the questions, time limit for fulfilling test tasks; approbation (pilot test) – to test the developed tools; Pearson correlation coefficient – to determine the correlation coefficient of task scores with the test total score.

The purpose of this research is to highlight the methods of approbation of test tasks and analyze their quality for non-standardized tests.

Results and discussions. At the current stage of reform of the professional pre-higher education system, the issue of test control of student knowledge and skills is becoming particularly important. According to A. Maiorov (2001, p. 14), a test is a tool consisting of a qualitatively verified system of test tasks, a standardized procedure for conducting and a predesigned technology for results processing and analysis, intended to measure the qualities and features of a person, which can be changed in the process of systematic training.

L. Yaroshchuk (2010, p.51) defines the concept of a test as a combination of test tasks that mainly require an unambiguous answer, developed under certain rules and procedures, provides for a preliminary experimental test and corresponds to such effectiveness characteristics as validity and reliability, and test control of knowledge is a method of measurement and assessment of knowledge, abilities and skills of a student by means of specially prepared standardized tasks (Luzan and Kalenskyi, 2014, p. 62).

There are standardized and non-standardized test depending on the level of unification. Standardized tests are tests that were subject to a special experiment for standards development (criteria score systems), reliability and validity checks based on a representative sample, and have well-described instructions and methodology (Bulakh, 2005; Yaroshchuk, 2010, p.52). However, in the activities of professional pre-higher institutions teachers, as a rule, use non-standardized tests, those compiled by themselves in certain academic subjects. This is due, firstly, to the fact that every academic subject taught in an institution of professional pre-higher education is constantly being improved, updated, and test tasks must be updated accordingly. Secondly, the use of non-standardized tests is predetermined by the following factors: much time spent by teachers on preparing tests and checking them for validity, time-consuming nature of the process, and the

lack of a unified methodology for a practicing teacher to check test tasks and the test as a whole for validity. Therefore, in practice, ineffective test tasks are often used, which do not allow us to accurately determine the scope and quality of the educational material learned by the students. Thus, solution to the problem of test quality is based on the mathematical calculations of certain indicators, namely: complexity of the test task, variance of scores, correlation coefficient of the task scores with the total test score.

When a set of test tasks from a module or discipline section is developed, you must start its approbation and analysis. Approbation, or, as it is termed by L. Burlachuk (2006), a pilot test, is conducted with a group of people who share characteristics with those for whom this test is intended. The purpose of approbation of test tasks is to:

- 1) determine the complexity of tasks and evaluate their suitability for students;
- 2) find tasks with significant shortcomings;
- 3) identify errors (spelling and punctuation mistakes, etc);
- 4) set the time limit to complete a task or a test as a whole;
- 5) analyze answers to open questions in order to specify the wording of correct answers;
- 6) identify shortcomings in the instructions.

Thus, in order to ensure the objectivity of data on the reliability of results obtained during the test control, it is necessary to check and confirm the validity of test tasks that will be included in the test of student learning outcomes assessment. Upon compiling a basic set of test tasks, it becomes necessary to check these tasks for relevance with the didactic goal to be reached. The effectiveness of the test is assessed through expert evaluation or comparison of testing results with assessments of other types of certification.

The first step towards test approbation is its expert evaluation. A group of teachers is formed based on the following criteria: academic degree and academic title, work experience in institutions of professional pre-higher education, taking into consideration their work experience as experts. The first expert review is made in order to assess the quality of a basic set of test tasks by expert teachers. The expert teachers assess the correctness of the wording of test tasks and the accuracy of questions, and set time for

performing test tasks by themselves. The answers of expert teachers are compared with the reference ones prepared by the developers of test tasks. The remarks on the development of test tasks are discussed together with the developer and relevant adjustments and clarifications are made to their content.

For the final verification of the conditions for the development of test tasks, another expert review is made in the form of a pilot test involving a group of student experts. It is further determined whether students understand the task conditions and whether they understand the order of its fulfilment. In addition, the time they spend on completing a particular task is recorded, and their wishes are taken into account.

If the expert review showed that students are not able to fulfil the test within the time limit established in the structure of lessons for such a test check, the test needs to be revised, that is, the number is shortened, the complexity of tasks is adjusted etc. If the preliminary time limit is unknown, the experts determine the time necessary for fulfilment of tasks. After completing the first version, the test is checked in the educational process as part of a trial testing (pilot test). The trial testing is the basis for collection of empirical material about the test quality. The statistical processing of this material enables developers to check the test for its validity and reliability. According to V. Avanesov (Avanesov, Khokhlova and Potap, 2005), in order to obtain statistically reliable results in trial testing, it is important to provide the following conditions:

1. Trial testing is to be held in several parallel groups. At the same time, it is recommended to conduct a trial testing twice in each group, provided that the test subjects receive two versions of the test with tasks that were not fulfilled before.
2. The number of subjects in groups should be at least 20 people.
3. All parallel groups are provided with the same conditions (time, place, duration of testing, etc.).
4. The time limit allotted for the trial testing is determined so that the most prepared students have time to answer all the questions of the test.
5. To get reliable results, it is necessary to minimize the possibility of sharing clues between the subjects of the test.

As soon as the trial testing is over, it is necessary to decide how to assess given answers to the questions. There are various models of assessment in the pedagogical literature. In our opinion, a dichotomous assessment model is the most convenient one: you will get one score for the correct answer (student ticked all correct solutions), but zero scores for the wrong answer (even if the student didn't tick at least one of all correct solutions, or, at least, one wrong solution in addition to correct ones). To check the test properties of tasks, the results of the trial testing shall be presented in a matrix format, which must be ordered. There are two orders in this matrix. The first of them relates to students who underwent testing, and the second refers to the lines with testing results, which are arranged in order of descending scores.

In the matrix of trial testing results, the lines with testing results are arranged in order of descending scores achieved by the students during testing: in the first line – surname of a student who achieved the highest score, and in the last – a student having the lowest score. We also use the above approach for fixing test tasks: from the easiest task to the most difficult one. The easiest test task is put on the first place, for which most correct answers were obtained, the task with less correct answers is put on the second, and so on, until the last one, for which only one correct answer was obtained. The scores achieved by all students in each of 10 tasks are indicated in the lower line of the table. The scores achieved by each subject of test is indicated in the last column of the table.

The matrix of testing results allows to make the first step in analyzing the quality of the test. For example, let's consider the matrix of testing results of knowledge of ten students (table 1).

The main indicators for selection of test tasks for the test are the following: (Luzan, Kalenskyi and Kolisnyk, 2017): complexity potential, variance of scores and correlation coefficient of the task scores with the total test score.

According to the experts, these indicators are the main criteria by which you can determine whether this task in the test form can be used in the test, or not. Therefore, it is necessary to make a number of statistical calculations (table 2) in order to check the test properties of tasks in the test form and render some of them into test tasks.

The important step in test development is to check the complexity of the proposed tasks. Let's first consider how to determine the complexity potential of tasks.

The complexity potential in modern testing is calculated as the ratio of the number of wrong answers to tasks and the number of correct answers according to the formula:

$$P = q_i / p_i ,$$

where  $P$  is the complexity potential,  $p_i$  is the percentage of correct answers of the subjects of test, and  $q_i$  is the percentage of wrong answers.

As seen from the Table 2.9, the first test task was answered correctly by all the respondents, and the tenth task, on the contrary, was not answered correctly by any student. After making calculations using the above formula, we get the following results: the complexity potential of task No. 1 equals to – 0 (0:10), and task No. 10 cannot be calculated (10: 0). Thus, tasks No. 1 and No. 10 should be removed from the list of test tasks that can be used when compiling tests.

Table 2.9  
Example of a matrix of testing results of a group consisting of 10 students

S No.	Surname of the student	Task number										Σ
		1	2	3	4	5	6	7	8	9	10	
1	Haleta	1	1	1	1	1	1	1	1	1	0	9
2	Borysovyh	1	1	1	1	1	1	1	1	0	0	8
3	Varlamenko	1	1	1	1	1	1	1	0	0	0	7
4	Avramenko	1	1	1	1	1	1	0	0	0	0	6
5	Dmytruk	1	1	1	1	1	0	0	0	0	0	5
6	Yanenko	1	0	0	0	0	1	1	1	1	0	5
7	Zakharenko	1	1	1	1	0	0	0	0	0	0	4
8	Kurinna	1	1	1	0	0	0	0	0	0	0	3
9	Smashko	1	1	0	0	0	0	0	0	0	0	2
10	Dontsiv	1	0	0	0	0	0	0	0	0	0	1
	Σ	10	8	7	6	5	5	4	3	2	0	-

Table 2.10  
Analysis of test results

Indicators	Task number									
	1	2	3	4	5	6	7	8	9	10
Number of correct answers	10	8	7	6	5	5	4	3	2	0
Number of wrong answers	0	2	3	4	5	5	6	7	8	10
Percentage of correct answers $p_i$	1	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.2	0
Percentage of wrong answers $q_i$	0	0.2	0.3	0.4	0.5	0.5	0.6	0.7	0.8	1
Complexity potential $P = q_i/p_i$	0.00	0.25	0.43	0.67	1.00	1.00	1.5	2.33	4.0	-
Variance of scores $S_i^2 = q_i p_i$	0	0.16	0.21	0.24	0.25	0.25	0.24	0.21	0.16	0
Correlation coefficient of task scores with total test score, $r_{xy}$	-	0.41	0.62	0.75	0.82	0.82	0.75	0.62	0.41	-

The second important feature of test tasks quality is the variance of scores, which can serve as an indicator of the task differential ability, that is, the ability to divide a group of students into "strong" and "weak". It should be noted that the higher the variance of scores, the better the differential ability of the task.

For tasks which use only a dichotomous score (1 or 0), the variance is calculated by the formula:

$$S_j^2 = p_j q_j,$$

where  $p_j$ ,  $q_j$  are the percentages of correct and wrong answers for each task. It is worth remembering that the higher the variance of scores, the better the differential ability of the task.

Determination of the correlation coefficient of task scores with total test score is the next statistical requirement for test tasks which is more accurate and technological measure of differential ability of the task.

To calculate the correlation coefficient, the Pearson product-moment coefficient is most often used:

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2} \sqrt{n \sum y^2 - (\sum y)^2}},$$

where  $r$  is the correlation coefficient;  $x$  is the result for each task;  $y$  is the score (result) for the entire test;  $n$  is the number of pairwise products;  $\Sigma$  – the summation sign.

For example, we calculate the correlation coefficient of scores on the seventh task ( $X_7$ ). For this purpose, an auxiliary Table 2.11 is built up, where the corresponding data are used.



The first column shows values of the scores achieved by the students for the seventh task. The sum of these scores is 4 ( $\sum X_7 = 4$ ). The second column shows the test scores achieved by each subject for all tasks, i.e. the total test score ( $\sum Y_i = 50$ ). In the third column, the products of the scores of each subject for the seventh task ( $X_7$ ) and sum of scores ( $Y$ ) are indicated;  $\sum Y_i \cdot Y = 29$ . The fourth and fifth columns show the squared values  $X_7$  and  $Y$ .

Respectively,  $\sum X_7^2 = 4$  i  $\sum Y^2 = 310$ .

To calculate the correlation coefficient, using the Pearson formula, we get:

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2} \sqrt{n\sum y^2 - (\sum y)^2}} = \frac{10 \cdot 29 - 4 \cdot 50}{\sqrt{10 \cdot 4 - 4^2} \sqrt{10 \cdot 310 - 50^2}} = 0,75$$

Tasks with a correlation coefficient more than 0.7 are considered to be key. Such tasks in the Table 2.10 are those under number 4, 5, 6, 7. In particular, it is recommended to include only those tasks in the test that have a correlation coefficient at least 0.25 – 0.3.

The higher the  $r_{xy}$  value, the more likely the task in the test form will be rendered into a test task, that is to be included in the test. The probability increases especially noticeably at  $r_{xy} \geq 0.5$ . If we calculate  $(r_{xy})^2 \times 100\%$ , we get the value of the so-called coefficient of determination, expressed in a convenient for interpretation percentage of the correlation between the task and the total test score of the subjects. For example, the coefficient of determination in the seventh task is equal to  $(0,8)^2 \cdot 100\% = 64\%$ . It can be interpreted as follows: 64 % of the variation of test scores of test subjects in all tasks is related to the variation of scores on the seventh task. It demonstrates a high potential of the seventh task to make its contribution to the overall variance of the test.

The analysis of the test properties of the task also contributes to the calculation of a complete correlation matrix, which provides correlations of each task with all other tasks, as well as correlations with the sum of scores. This work is best done with the use of personal computers, by means of statistical packages.

Upon expert review and elimination of the identified shortcomings, a basic set of test tasks can be presented to students for use.

Table 3  
Table for the correlation coefficient calculation

S No.	Surname of students	Score on task No.7, $X_i$	Total test score, $Y_i$	$X_i, Y_i$	$X^2$	$Y^2$
1	Haleta	1	9	9	1	81
2	Borysovych	1	8	8	1	64
3	Varlamenko	1	7	7	1	49
4	Avramenko	0	6	0	0	36
5	Dmytruk	0	5	0	0	25
6	Yanenko	1	5	5	1	25
7	Zakharenko	0	4	0	0	16
8	Kurinna	0	3	0	0	9
9	Smashko	0	2	0	0	4
10	Dontsiv	0	1	0	0	1
	$\Sigma$	4	50	29	4	310

**Conclusions.** The research deals with approbation of non-standardized tests, their expert checks for correctness of the wording of the task, the accuracy of the wording of the questions, conditions for the implementation of trial testing; criteria for the selection of test tasks: the complexity potential; the variance of scores; the correlation coefficient of the task scores with the total test score. The further research will be focused on conducting a special experiment to create standardized tests, namely: check for reliability and validity based on a representative sample.

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## 2.5. EVALUATION OF QUALITY OF TRAINING OF SPECIALISTS IN COLLEGES: THEORY, PRACTICE, PROSPECTS

### ОЦІНЮВАННЯ ЯКОСТІ ПІДГОТОВКИ ФАХІВЦІВ У КОЛЕДЖАХ: ТЕОРІЯ, ПРАКТИКА, ПЕРСПЕКТИВИ

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*Relevance. The conformity of the quality of education to the needs of man, society, and the state determined the need to modernize Ukrainian education and ensure a balance between the demands of the labor market and the development of the system of professional higher education. Solving problems in improving educational technologies*

*and implementing innovative teaching methods is an urgent task in developing pedagogical tools for the formation of general and professional competencies, criteria and methods for assessing the achievement of students' planned learning outcomes.*

*The purpose is to analyze the theory, practice and prospects of assessing the quality of training in colleges.*

*Methods. To achieve this goal, a set of theoretical (description, analysis, synthesis, comparison, generalization) and empirical (observation, survey, questionnaire) research methods were used.*

*Results. The essence of the study is that improving the quality of training in vocational higher education institutions, taking into account the peculiarities of reforming the domestic education system and the needs of the national labor market is not possible without modern methodological support for assessing their training. The study of interpretations of the concept of "quality of education" identified the types of dependence on the quality of training and the need to form personal professional qualities for students to acquire professional skills and abilities. Conducting a survey of teachers with different teaching experience and academic titles from different regions of Ukraine allowed to clarify the current features of assessing the quality of training in technical schools and colleges. In order to study the readiness of teachers to assess the quality of training in technical schools and colleges, questionnaires were developed and sent to all educational institutions with which a cooperation agreement has been signed. According to the results of the survey, the authors proposed a modernization of the set of main principles for assessing the quality of education and ways to achieve objective pedagogical control.*

*Conclusions. The application of the basic principles of assessing the quality of vocational education, using experimental research has proved the need to take into account the pedagogical conditions for proper assessment of the quality of training in colleges. The results of the study of quality assessment of training in technical schools and colleges necessitated the development of a set of measures to modernize the assessment of quality of training. In the course of the study of teachers' readiness to assess the quality of training, the need to introduce a methodological system for assessing the quality of training in institutions of professional higher education and develop its structural model was proved.*

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*Актуальність. Відповідність якості освіти потребам людини, суспільства, держави визначило необхідність модернізації української освіти та забезпечення балансу між запитами ринку праці і розвитком системи фахової передвищої освіти. Вирішення проблем з вдосконалення освітніх технологій та впровадження інноваційних методів навчання є актуальним завданням розроблення педагогічних засобів формування загальних і професійних компетентностей, критеріїв і методик оцінювання досягнення студентами запланованих результатів навчання. Мета – аналіз теорії, практики та перспектив оцінювання якості підготовки фахівців у коледжах.*

*Методи. Для досягнення визначеної мети застосовано сукупність теоретичних (опис, аналіз, синтез, порівняння, узагальнення) та емпіричних (спостереження, опитування, анкетування) методів дослідження.*

*Результати. Сутність дослідження полягає в тому, що підвищення якості підготовки фахівців у закладах фахової передвищої освіти з урахуванням особливостей реформування вітчизняної системи освіти та потреб національного*

ринку праці не можливе без сучасного методичного забезпечення оцінювання їхньої підготовки. Вивчення трактувань поняття «якості освіти» визначили види залежності якості професійної підготовки та необхідність формування особистісних професійних якостей для набуття студентами професійних умінь і навичок. Проведення опитування педагогічних працівників, з неоднаковим педагогічним стажем та науковими званнями з різних областей України дозволило з'ясувати сучасні особливості оцінювання якості підготовки фахівців у технікумах і коледжах. З метою дослідження готовності викладачів до оцінювання якості підготовки фахівців у технікумах і коледжах розроблено і розіслано анкети до всіх навчальних закладів, з якими підписано договір про співробітництво. За результатами анкетування авторами запропоновано модернізацію комплексу головних принципів оцінювання якості навчання та шляхи досягнення об'єктивного педагогічного контролю.

*Висновки.* Застосування основних принципів оцінювання якості професійної освіти, використовуючи експериментальні дослідження дозволило довести необхідність врахування педагогічних умов для належного оцінювання якості підготовки фахівців у коледжах. Результати дослідження оцінювання якості підготовки фахівців у технікумах і коледжах обумовили необхідність у розробці комплексу заходів щодо модернізації оцінювання якості підготовки. В ході дослідження готовності викладачів до оцінювання якості підготовки фахівців доведено необхідність запровадження методичної системи оцінювання якості підготовки фахівців у закладах фахової передвищої освіти та розроблення її структурної моделі.

**Keywords:** *quality of training, assessment, college, professional higher education.*

**Ключові слова:** *якість підготовки, оцінювання, коледж, фахова передвища освіта.*

**Introduction.** One of the most important tasks facing Ukraine is its sustainable innovative development. The need to modernize the training of specialists is due to the formation of a new educational policy of Ukraine, where the priority is to ensure the appropriate quality of education based on maintaining its fundamentality and compliance with the mature and far-reaching needs of man, society and state.

Particular attention is paid to the quality of vocational education as a guarantor of sustainable development of the state economy, providing it with mobile, competent professionals. Problems of reforming the Ukrainian education system, development and implementation of market mechanisms for regulating its relations with the real economy, training are today among the most important national problems.

In these conditions, the competitiveness of the future specialist acquires the status of one of the leading indicators of the work of institutions of professional higher education and is the ability of educational services to meet the demands and expectations of consumers. Quality management is designed to ensure a balance between the demands of the labor market, the needs of the developing individual and the development of the system of professional higher education in general.

Head The task of professional higher education is not only the formation of knowledge, skills and abilities, but also the development of the ability to adapt to changes in technology, technology, labor organization. One of the problems is the improvement of educational technologies, the introduction of innovative teaching methods based on constant interaction between teacher and student. The nearest urgent task is the development of pedagogical tools for the formation of general and professional competencies, as well as criteria and methods for assessing the achievement of students' planned learning outcomes. The scientific research "Methodical bases of estimation of quality of preparation of experts in establishments of professional higher education" begun in Institute of professional and technical education is directed on the decision of these problems.

The essence of the study is that improving the quality of training in vocational higher education institutions, taking into account the peculiarities of reforming the domestic education system and the needs of the national labor market is not possible without modern methodological support for assessing their training.

**Sources.** The analysis of the literature on the problem of assessing learning outcomes in the context of the competency approach showed that this issue is quite thoroughly researched and covered in the scientific achievements of teachers and psychologists. Studies of domestic and foreign scientists are devoted to various aspects of assessing the quality of training of future specialists: psychological and pedagogical aspects of assessing the quality of training are comprehensively covered in the works of Yu. Oliynyk, P. Pidkasisty, I. Pidlasy, M. Skatkin, N. Talyzina, I. Kharlamov and others, A. Aleksyuk, Y. Babansky, V. Ilyin, I. Pidlasy, V. Yagupov and others studied the quantitative evaluation methods. others; I. Bulakh, V. Ilyin, E.

Luzik, O. Mokrov, I. Romanyuk, V. Polyuk, G. Tsekhmistrova and others studied approaches to the organization of quality assessment of training.

Despite the significant research achievements, they are mostly theoretical in nature and do not provide practical advice on the assessment of students in a competency-based approach. The problem of assessing learning outcomes remains relevant and one of the main topics of discussion, both in the domestic and global educational environment.

At present, the issues of methodological support for assessing the quality of training in vocational higher education institutions, which should reliably ensure the comparison of students' academic achievements with the goals of their professional training, remain insufficiently studied. In this regard, the need to study the status of assessing the quality of training in institutions of professional higher education.

**The purpose** is to analyze the theory, practice and prospects of assessing the quality of training in colleges.

**Methods.** To achieve this goal, a set of theoretical (description, analysis, synthesis, comparison, generalization) and empirical (observation, survey, questionnaire) research methods were used.

**Results and discussion.** In modern conditions, one of the priority aspects of educational policy of our country is to ensure the quality of education, its compliance with socio-professional requirements and personal expectations of consumers of educational services. These issues are taken care of by the standardization of professional higher education, which determines the establishment of regulatory requirements for qualification standards for educational outcomes (competencies) of graduates of vocational education institutions, provides permanent comparison of students' academic achievements with the goals of their competence-oriented training. professional training of specialists in vocational education institutions by means of innovative content and learning technologies and promotes the convertibility of levels of vocational education within the state and abroad (Kalensky et al., 2018, p. 4).

It is high professional training that becomes a factor in a person's social protection in the new economic conditions. The task of vocational education is not only the formation of knowledge, skills and abilities, but



also the development of the ability to adapt to changes in technology, technology, labor organization.

Priority attention to quality issues is due to the following main factors:

- the need to correlate the main goals of vocational school development with the state educational policy (state educational standard, licensing, certification, state accreditation of vocational education institutions);
- the problem of compatibility of certificates and diplomas of vocational education, their recognition and gradual entry into the world labor market;
- the need to involve social partners in determining the content and level of professional education in order to objectively assess the quality of graduates of educational institutions.

The UNESCO Program Document "Reform and Development of Higher Education" states: "The quality of higher education is a concept that is characterized by many aspects and largely depends on the contextual framework of the system, institutional objectives or conditions and norms in this discipline."

Currently, in the scientific environment and the environment of higher education practitioners there are different interpretations of the concept of quality of education, which are based on different structural combinations of such categories as "education standard", "educational result", "quality of the educational process", etc.

The quality of training is determined by the conformity of knowledge, skills, abilities acquired in the educational institution, the formation of professionally necessary personal qualities, the requirements of modern production, the level of production relations and prospects for their development.

The quality of professional training of the future specialist in the special literature means:

- the degree of compliance of the level of training with the professional requirements for him as a specialist, professional (Guslyakova, Sintsova, and Popkova, 2000, p.49);
- the effectiveness of a particular educational institution or vocational education system as a whole (Frolov and Makhotyn, 2004, p.37);

– a set of characteristics of professional consciousness that determine the ability of a specialist to successfully carry out professional activities in accordance with the requirements of the economy at the present stage of development (Khoruzhenko, 2008, p. 95);

– demand for the acquired knowledge in the specific conditions of their application, compliance with the professional orientation of the specialist and his specific knowledge and skills (Lukyanchenko and Laricheva, 2011, p. 51).

The quality of training depends on:

- optimal selection of content;
- ways of realization of educational disciplines (technology, methodical system, etc.);
- competencies of specialists of higher education institutions;
- development of personal and professional orientation of students in the educational process of the educational institution.

Thus, the quality of training of future professionals is seen as a deep mastery of specially selected, structured theoretical material on the basics of the specialty for students to acquire professional skills and the formation of the necessary personal professional qualities in a specially organized, professionally oriented learning process. This creates the preconditions for the realization of the personal potential of students under any circumstances and at any time.

As stated in the Law of Ukraine "On Professional Higher Education" (2019), the main criterion for the effectiveness of professional training in colleges is the quality of professional higher education, compliance with educational conditions and learning outcomes to the legislation and standards of professional higher education, professional and / or international standards. (if available), as well as the needs of stakeholders and society, which is provided through the implementation of procedures for internal and external quality assurance of education (Verkhovna Rada of Ukraine. Legislation of Ukraine, 2019).

It is the compliance of learning outcomes with the requirements of the standards of professional higher education that is the parameter of the efficiency of the educational process, which is called the quality of professional training. The guidelines for the development of higher

education standards state that educational outcomes are a set of knowledge, skills, abilities and other competencies declared in educational standards that must be mastered by a person in the process of learning a certain educational and professional program and can be identified, quantified and measure (Guidelines for the development of standards of higher education, 2017).

Practice shows that one of the reasons that can significantly reduce the effectiveness of training may be the bias in assessing the level of their training, due to the imperfection of the evaluation system or the lack of the necessary evaluation methodology for the selected criteria. Incorrect values of training quality assessment form a misconception about the capabilities and willingness of the specialist to realize their potential, require adjustments to the content and direction of further training, reducing the overall effectiveness of the training system.

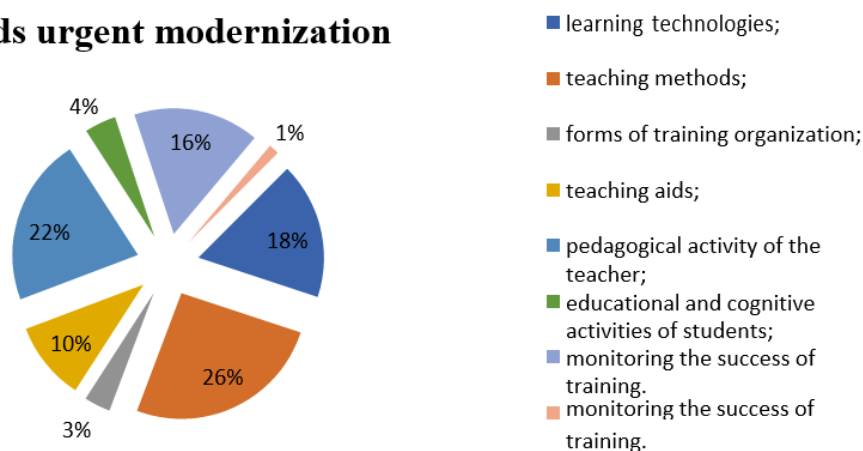
Before proceeding to the study of theoretical and methodological aspects of assessing the quality of training in institutions of higher professional education, it is necessary to analyze the current state of training. Teachers of about 50 educational institutions of professional higher education from different regions of Ukraine (including about 20 educational institutions that train specialists for construction) industries), different in their characteristics, with different teaching experience and academic titles.

In particular, it was found that the work experience of the vast majority of teachers of construction colleges (51%) is from 11 to 20 years; 35% of teachers with experience of more than 20 years have been identified, 22% of respondents have experience of 4 to 10 years, and only 3% of teachers of higher (pre-higher) education institutions have experience of up to 3 years. Most teachers have the highest category of teachers (51%), the least number of teachers have the category of teacher-specialist (5%). Some teachers have the degree of candidate of pedagogical sciences.

As a result of the survey conducted in institutions of higher (pre-higher) education in the construction industry, teachers believe that their school needs priority modernization (Figure 2.9) of learning technology (25.7% of respondents), teaching aids (21.6%), content education (17.6%), educational and cognitive activity of students (16.2%), forms of organization of education (10.1%), pedagogical activity of a teacher (4.1%) and teaching

methods (3.4%), control learning success (1.4%).

### Needs urgent modernization



Note. Created by the author.

Figure 2.9. Components of the pedagogical process of training junior construction specialists in need of priority modernization

That is, the quality of assessment in construction colleges does not need to change. This is probably because most teachers are superficially familiar with the method of assessing the quality of training of future professionals. This is confirmed by the results of the survey.

Studies have shown that the term "quality of professional higher education" is familiar to only 18% of teachers, and 57% of respondents are not familiar with the content of the Law "On Professional Higher Education".

29% of teachers of professional construction colleges who took part in the survey can correctly determine the types of control according to the specified classifications.

When asked to rank the personal qualities of future professional junior bachelors-builders in order to ensure high-quality professional training, the teacher was noted that the teacher must first of all have a professional interest, be communicative, organized, creative and independent.

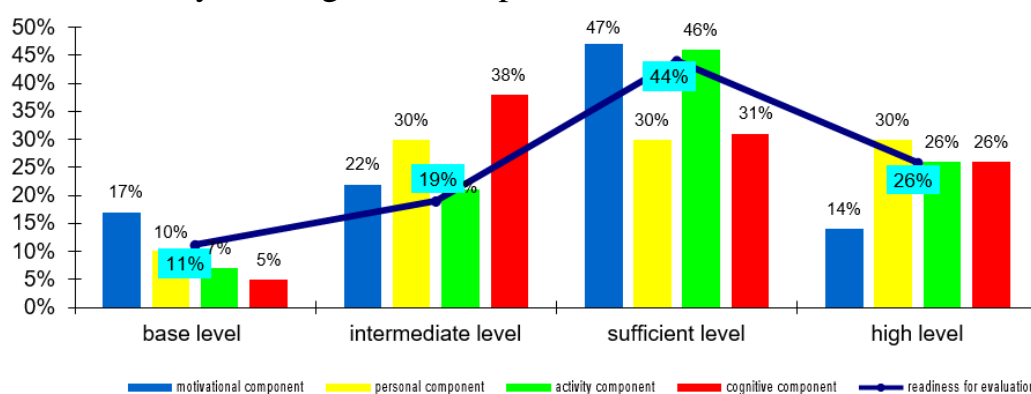
Analysis of the answers to the questionnaire "Which components of the classification of value, affective or emotional sphere (W. Krathwoll, 1964) include: independence and responsibility in work, professional respect for ethical principles, demonstration of good professional, social and emotional behavior, healthy lifestyle etc." found that only a third (33%) of teachers knew the correct answer. From the research it becomes obvious that there is a discrepancy between the theory and practice of assessing the quality of training in institutions of professional higher education. Thus, the

analysis showed that the most important direction in the development of quality assessment at this stage is to improve the assessment methodology, built on the methodological basis of an integrated approach.

In order to study the readiness of teachers to assess the quality of training in technical schools and colleges, we developed questionnaires and sent them to all educational institutions with which a cooperation agreement has been signed.

The structure of teachers' readiness to assess the quality of training in colleges and technical schools provides for the unity of cognitive, motivational, activity and personal components.

In the study of teachers' readiness to assess the quality of training in technical schools and colleges of construction (Figure 2.10) found that most teachers are characterized by a sufficient level of formation of motivational, personal, activity and cognitive components.



Note. Created by the author.

Figure 2.10. Levels of readiness of teachers to assess the quality of training of construction professionals.

A high level of readiness, which is creative in nature, is formed in a very limited circle of teachers, which indicates the need to organize special work for its purposeful formation.

The answers of qualified teachers to the questionnaire allowed us to conclude that the successful training of specialists in higher education institutions requires restructuring the usual system of educational process, improving the content, forms, methods, teaching aids, tools and procedures for assessing student achievement. First of all, Luzan PG believes. (2020), it is necessary to modernize the set of main principles of evaluation of learning outcomes, such as:

– clear definition of expected learning outcomes: the learning outcomes planned for the examination must correspond to the educational goals and objectives; must meet such criteria as the possibility of verification, specificity, educational results must be correlated with sufficient time for their study by students; professional orientation of control is determined by the targeted training of the specialist and helps to increase the motivation of students' cognitive activity.

– objectivity of assessment of students' competence achievements: the principle of objectivity provides assessment in the process of control over scientifically developed objective criteria, creation of conditions under which students' knowledge would be revealed as accurately as possible, uniform requirements for them, fair treatment of everyone, avoidance subjective evaluative judgments and conclusions of the teacher, which are based only on a superficial examination of knowledge, skills and abilities of students.

Objectivity of pedagogical control is achieved in different ways. The first, traditional way is to form a collegial assessment, for which various commissions are created, the composition and number of members of which depends on the importance of the case to be controlled. The resulting estimates are often called objective, although it is known that the addition of several subjective opinions does not always reflect the objective state.

Another way is to take diagnostic procedures beyond the "teacher-student" relationship, as well as through the use of objective methods of assessing academic achievement (practical control, testing, projects, graphical testing, etc.). The main thing for the principle of objectivity is that the assessment of knowledge should not be influenced by the likes and dislikes of the teacher, should be equal, the same conditions in content, form, methods of assessing the quality of training, the same assessment criteria for all students.

– systematic and systematic assessment of student learning outcomes: assumes that the acquisition of knowledge and skills is carried out in a certain order, which requires a logical construction of content and stages of control, as well as the sequence of different forms, types and methods of control at different stages. Compliance with the requirements of the principle of systematicity and systematicity allows to obtain the most complete and

timely information about the degree of achievement of the planned results of the educational process. In addition, the requirements of the principle of systematicity determine that the control of knowledge and skills should be carried out at all stages of learning from initial perception to the practical application of knowledge and skills. The procedure for assessing the results of students' academic achievements should not be carried out spontaneously, but in compliance with a clear plan, which should be familiarized in advance to all participants in the educational process;

– unity of requirements: control tasks should take into account the requirements of national standards of educational content in accordance with the qualification characteristics of specialties. The principle of unity of requirements to control by all scientific and pedagogical workers provides to be guided in an estimation of students by uniform system of requirements and criteria.

– a positive approach in assessing student learning outcomes. Assessment as a result of assessment should focus on the level of achievement and progress of the student, not to emphasize his failures. A positive approach provides an actual, stimulating impact on the development of educational and cognitive activities of the future specialist, cognitive needs and motives of students. Evaluation should be tactful carried out in a calm business environment. Students should not be in a hurry to answer or interrupt questions. All comments, instructions and assessments must be made in a tactful and friendly manner. Students must know the content (what will be controlled), the means (how the control will be carried out), the timing and duration of the control. The control becomes the more effective, the psychophysiological features of the controlled are more fully considered. The highest pedagogical requirement is the presence of students' trust in the teacher and their faith in themselves, the teacher's respect for the student.

– individual approach in assessing the results of students' academic achievements requires control of the direct educational work of each student, does not allow the substitution of individual students' learning outcomes by the results of the team, and vice versa. Mastering knowledge and skills is an individual process. Each student acquires knowledge and skills in accordance with their psychological and physiological characteristics. All students are subject to the same requirements for the

amount of knowledge, the level of skills, but in some cases, it is necessary to take into account the individual qualities of students;

- multidimensionality of assessment of students' academic achievements during the assessment it is important to determine the level of all components of professional competence acquired by future professionals (professional knowledge, skills, formation of professional qualities of the graduate, etc.).

- the adequacy of tools for assessing the competencies of students. The system of assessment methods and procedures should be correlated with educational tasks, assessment functions. The use of only one of the tools does not allow to draw conclusions about the impact of learning on all components of behavioral competence of students. Therefore, at least four tools should be used, each of which is the most adequate for assessing the relevant object of knowledge, attitudes, skills, intentions and behavior.

- compliance with the balance of the subjects of evaluation. To draw adequate conclusions, it is very important to obtain information from different groups (subjects of assessment): teachers, students themselves, their peers and others. In addition, self-esteem develops students' ability to self-analysis, goal setting and analysis of their own achievements. The use of self-assessment allows you to participate not only in obtaining the result, but also in its analysis.

Naturally, compliance with the requirements of these principles is possible by providing certain pedagogical conditions for assessing the quality of professional training, which include: the orientation of working curricula of disciplines on educational outcomes declared in educational standards; purposeful application of valid, reliable, accurate methods of objective assessment of students' academic achievements; application of several evaluation tools; formulation of objective and understandable for students learning goals; providing effective feedback; early acquaintance of students with assessment criteria; purposeful activation of educational and cognitive activity of students; adjusting the content and process of the educational process based on the results of assessing its quality, etc.

Therefore, the assessment of the quality of training as a procedure for comparing certain learning outcomes of students with the competencies declared in educational standards should be carried out in accordance with



the characterized principles and reasonable pedagogical conditions. For this purpose it is necessary to create a methodical system of purposeful formation of readiness of pedagogical workers for assessment of quality of preparation of experts in colleges and to provide scientific and methodical support of processes of development of readiness of pedagogical workers for assessment in the conditions of concrete establishment of professional education.

Assessment of the quality of training in institutions of professional higher education, as a system includes: development and approval of qualification standards for assessment of vocational education; substantiation and implementation of pedagogical methods and assessment technologies; assessment of educational results (competencies) of students.

The quality of professional training of future professionals is seen as a deep mastery of specially selected, structured theoretical material on the basics of the specialty for students to acquire professional skills and the formation of the necessary personal professional qualities in a specially organized, professionally oriented learning process. This creates the preconditions for the realization of the personal potential of students under any circumstances and at any time.

Assessing the quality of vocational education is based on the following basic principles: clear definition of expected learning outcomes; objectivity of assessment of students' competence achievements; systematic and systematic assessment of student learning outcomes; unity of requirements; a positive approach in assessing student learning outcomes; individual approach when evaluating the results of students' academic achievements; multidimensionality of assessment of results of educational achievements of students; adequacy of tools for assessing students' competency achievements; compliance with the balance of the subjects of evaluation.

Based on the analysis of the obtained experimental data, it is proved that in order to properly assess the quality of training in colleges, it is necessary to take into account the relevant pedagogical conditions.

The study of the state of quality assessment of training allowed to conclude that the current features of quality assessment of training in technical schools and colleges is characterized by a system of organizational destructive factors that necessitate the development of a set of measures to

modernize the quality of training in technical schools and colleges. development of innovative technologies for objective assessment of competence achievements of future junior specialists.

In the study of teachers' readiness to assess the quality of training in colleges and universities found that most teachers are characterized by an average and sufficient level of formation of motivational, personal, activity and cognitive components, indicating the need for special work for its purposeful formation through the introduction of methodological systems for assessing the quality of training in institutions of professional higher education.

Prospects for further research are associated with the substantiation of the methodological system for assessing the quality of training in institutions of professional higher education and the development of its structural model.

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## CONCLUSIONS

In the collective monograph, a theoretical generalization was made and a solution to the scientific problem of increasing efficiency and evaluating the quality of vocational education and training was proposed. The obtained results confirmed the hypothesis, proved the achievement of the goal, the solution of the set tasks and made it possible to formulate the following conclusions.

Based on the analysis of available scientific publications and educational practice, it has been proven that the current state of vocational education and training does not fully meet the up-to-date needs of the labour market. The main factors of negative impact include: the long process of formation of the vocational education system and structural changes in the activities of relevant educational institutions; incompleteness of legislative and departmental regulation at that educational level; insufficient financing of vocational education institutions; the imperfect mechanism of forming the state order, which does not fully reflect the needs of the labour market; insufficient participation of employers in shaping the content of education, solving problems of vocational education; insufficient personnel potential and imperfection of the system of teaching staff professional development.

The features of ensuring and evaluating the quality of specialist training include:

- in institutions of vocational education of an agrarian profile - the content of educational tasks should combine verbal and visual information means, since the visual memory of rural students is mostly well developed. That contributes to the recall of knowledge and the development of verbal and logical memory;

- in institutions of the construction profile, the dominant method of forming competences and assessing students' competence achievements is the graphic method based on the performance of a set of tasks (mini-graphic tasks, calculation-graphic tasks, individual graphic tasks, multifunctional tasks, professionally-oriented graphic tasks, complex situational tasks, course and diploma projects, etc.);

- in institutions of vocational education of the mechanical engineering profile, when designing educational tasks, tasks for evaluating the educational achievements of students in technical disciplines, one should take into account the degree of difficulty of engineering objects to be studied and focus on this aspect when selecting control methods.

In the monograph, the principles were defined and substantiated (clear definition of expected learning outcomes; objectivity of assessment of

students' competence achievements; systematicity of assessment of students' learning outcomes; unity of requirements; positive approach in student education; individual approach during education and evaluation of students' educational achievements; multidimensional assessment of students' educational achievements, adequacy of assessment tools for students' competence, compliance with assessment subjects; confidentiality of information about student learning results) and pedagogical conditions for assessing the quality of specialist training in vocational education institutions (use of several assessment tools, each of which is the most adequate for assessing the relevant object being diagnosed; tools for assessing the quality of specialist training should be relevant assessment objects and the characteristics of students; the production of conclusions about the quality of training of specialists is carried out on the basis of the triangulation method of increasing reliability taking into account information from various sources, including self-assessments of students and mutual evaluations of group mates; advance familiarization of students with the criteria for evaluating the quality of their training in institutions of vocational pre-higher education); a methodical system for ensuring and evaluating the quality of specialist training in vocational education institutions has been developed and substantiated as a complex dynamic entity that hierarchically combines interrelated components (purpose, task, content, means, stages, methods, forms, criteria, indicators and results of specialist training) into an organizational and technological construct, which consists of target, content, instrumental, organizational-methodical, diagnostic, result-reflective blocks.

The methodology for evaluating competences (educational results) has been improved based on the conceptual and content analysis of the components of professional action using the technology of test control, which covers four consecutive stages: organizational and target (determining the purpose and tasks of testing; structuring educational material or compiling a register of knowledge; choosing the type of test tasks; development of sets of test tasks); expert (expert evaluation of test tasks by expert teachers; expert evaluation of test tasks by expert students; trial testing; selection of valid test tasks for the basic set); design (compilation of a test from a basic set of test tasks; preliminary testing of the quality of the test; evaluation of the validity and reliability of the test; decision-making regarding the use of the test); summative (testing; evaluation of test results);

The essential content of the concepts is specified: "evaluation of the quality of training of specialists" was defined as the process of establishing the levels of educational achievements of vocational education seekers in mastering the content of an educational discipline (topic, module, etc.) in

accordance with the requirements of current educational and professional programs; "the readiness of a pedagogical worker to assess the quality of training of specialists in vocational education institutions" was interpreted as an integrative, complexly structured property of the personality, which is manifested in the diagnostic activity, behavior and actions of the teaching staff and determines the ability to objectively evaluate the competence achievements of students due to a balanced combination knowledge and ability to apply valid methods, tools, technologies for measuring learning results against the background of a developed moral and value focus on ensuring the quality of the educational process in an institution of vocational pre-higher education; "the pedagogical mastery of a teacher of a vocational education institution" was presented as an integrative complex property of the individual, which was based on perfect professional and pedagogical competence, ensures a high level of self-organization of pedagogical activity due to the synthesis of knowledge, experience, values and qualities of the teacher and was manifested in the creative solution of professionally oriented mastery tasks acquirers of the system of knowledge in the disciplines of general education/professional training for the development of key (generally professional, special) competences of future skilled workers/professional junior bachelors; "quality of specialist training in vocational education institutions" was defined as compliance of training results with the requirements of qualification standards (if available), educational and professional programs, demands of society, the labour market, employers and the individual himself; "educational results" was considered as a set of knowledge, abilities, skills, and other competencies declared in educational standards, which must be mastered by a person in the process of studying under a certain educational and professional program, and which can be identified, quantified and measured.

The conducted research does not cover all aspects of the outlined problem. The authors connect the prospects of further scientific research with an in-depth conceptual analysis of the features of providing and evaluating the quality of specialists' training for the service sector.

*Scholarly Publication*

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**edited by O. Titova and P. Luzan**

## **THE MEANS OF ENSURING THE QUALITY OF SPECIALISTS TRAINING IN VOCATIONAL EDUCATION INSTITUTIONS**

*Monograph*

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### **ЗАСОБИ ЗАБЕЗПЕЧЕННЯ ЯКОСТІ ПІДГОТОВКИ ФАХІВЦІВ У ЗАКЛАДАХ ПРОФЕСІЙНОЇ ОСВІТИ: МОНОГРАФІЯ**

*У монографії представлено основні напрями підвищення ефективності підготовки фахівців у закладах професійної освіти, методичні основи оцінювання якості підготовки майбутніх фахівців у закладах професійної та фахової передвищої освіти. Наведено деякі приклади застосування інноваційних методів оцінювання якості підготовки здобувачів професійної та фахової передвищої освіти.*

*Видання адресоване педагогічним працівникам закладів професійної та фахової передвищої освіти, науковцям, розробникам державної політики у сфері професійної освіти, спеціалістів системи післядипломної педагогічної освіти, керівників, роботодавців та студентів.*

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