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## ANALYSIS OF FEATURES AND GENERALIZATION OF THE EXPERIENCE OF VOCATIONAL EDUCATION TRAINING FOR THE OIL AND GAS INDUSTRY

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The paper presents materials highlighting important and current problems of training masters of vocational education for the oil and gas industry in various aspects of scientific and educational activities. The relationship between the conditions of innovative development of the oil and gas industry and its personnel support is also covered in the paper. The requirements for employment of specialists in the oil and gas industry are analyzed, and it is shown how they are taken into account in the preparation of masters in the educational program “Professional Education (Oil and Gas)” of the second master’s level of higher education. The relevance of the development and implementation of the system of training educational personnel for the industry is also justified. The results of the analysis of the educational program are presented, and the experience of training students in accordance with this program at Ukrainian Engineering Pedagogics Academy is summarized. The structure and content of the educational program is analyzed. The features and uniqueness of the educational program are shown. It is demonstrated that the interests and suggestions of stakeholder groups were taken into account when formulating the goals and program outcomes of the educational program in the contexts of the industry and region specifics. The paper demonstrates that the goals and program results of the educational program reflect trends in the development of the specialty and the job market. It is also highlighted that the educational program allows achieving educational results that meet the requirements of the National Framework of qualifications and are defined by the standard of higher education. The mechanisms of forming an individual educational trajectory of higher education students according to the educational program are presented. The structural and logical scheme of the educational program is exhibited; its implementation in the educational process is justified. The paper analyzes the particularities of the development and implementation of the vocational education system for the oil and gas industry, formulates and summarizes the scientific and educational results that were obtained by the authors during the implementation of the project.

**Keywords:** oil and gas industry, training of higher education students, training system, educational program.

*Антоненко Н. С. Прокопенко О. О., «Аналіз особливостей та узагальнення досвіду підготовки магістрів професійної освіти для нафтогазової галузі».*

У роботі представлено матеріали, що висвітлюють важливі й актуальні проблеми підготовки магістрів професійної освіти для нафтогазової галузі в різних аспектах науково-педагогічної діяльності. Висвітлено взаємозв’язок умов інноваційного розвитку нафтогазової галузі та її кадрового забезпечення. Проаналізовано вимоги, які висувають при працевлаштуванні до фахівців нафтогазової галузі та показано, які враховано при підготовці здобувачів вищої освіти за освітньою програмою «Професійна освіта (Нафтогазова справа)» другого магістерського рівня вищої освіти. Обґрунтовано актуальність створення і впровадження системи підготовки і інженерно-педагогічних кадрів для галузі. Наведено результати аналізу освітньої програми та узагальнено досвід підготовки здобувачів за цією програмою в Українській інженерно-педагогічній академії. Проаналізовано структуру та зміст освітньої програми. Показано особливості й унікальність ОП. Доведено, що під час формулювання цілей та програмних результатів навчання освітньої програми були враховані інтереси та пропозиції груп зацікавлених сторін (стейкхолдерів) та галузевий і регіональний контексти. Продемонстровано, що цілі та програмні результати навчання освітньої програми відбивають тенденції розвитку спеціальності та

ринку праці. Показано, що освітня програма дозволяє досягти результатів навчання, що задовольняють вимогам Національної рамки кваліфікацій та визначені стандартом вищої освіти. Наведено механізми формування індивідуальної освітньої траєкторії здобувачів вищої освіти за освітньою програмою. Наведено структурно-логічну схему освітньої програми, обґрунтовано її реалізацію в освітньому процесі. Таким чином, у роботі проведено аналіз особливостей створення і впровадження системи підготовки магістрів професійної освіти для нафтогазової галузі, сформульовано й узагальнено науково-педагогічні результати, які були отримані авторами при реалізації проєкту.

**Ключові слова:** нафтогазова галузь, підготовка здобувачів вищої освіти, система підготовки кадрів, освітня програма.

**O. Prokopenko, N. Antonenko** "Analysis of features and generalization of the experience of vocational education training for the oil and gas industry"

**Statement of the problem in a general way.** One of the main conditions of oil and gas industry innovative development is its manpower: specialists, working at the enterprises must have a training level, meeting the requirements of the enterprise, have modern knowledge and skills, have up-to-date knowledge and skills and apply their knowledge in practice and should be motivated to make personal growth and achieve progress in their career as well.

The peculiarity of industry specialists is their understanding that oil and gas, which are now effectively used in industrial production as various types of raw materials or sources of energy, are exhaustive ecosystem resources. To solve the issues of rational use of oil and gas, the development of which has a very high rate, is now especially crucial.

Another important requirement for specialists is their ability to be up to speed on modern innovative and energy-efficient technologies, to implement the results of modern scientific research and technical developments in practice, the ability to make competent production decisions on their own in a constantly evolving environment, to ensure environmental friendliness and safety of production.

The oil and gas industry is considered potentially dangerous. Nowadays the increasing complexities of production technologies determines the vital necessity to improve the level of specialists' professional training systematically. The specific nature of oil and gas industry implies constant retraining and workers' adaptation to continuously changing working conditions. Special attention is paid to training and retraining of the personnel involved in the work at industrial sites of the branch enterprises. Implementation of the objectives became the task of the relevant units, which should be provided with specialists having the appropriate education and skills of theoretical and practical personnel training and a

combination of two relatively independent and simultaneously interrelated types of professional activities - pedagogical and engineering.

The problems, associated with the design of the professional training content of engineers-teachers for the oil and gas industry, strengthening the requirements to the level of their professional competence development, are relevant to ensure the safety and development of branch enterprises.

**Analysis of research and publications on the problem.**

Problem solving on professional training of future engineers-teachers is widely represented in the studies of modern scientists, in particular, V. Batalov, N. Brukhanova, A. Ganopolsky, R. Gorbatyuk, E. Zeer, I. Kankovsky, O. Kovalenko, M. Lazarev, T. Lazareva, A. Romanovsky, A. Seiteshev, L. Tarkhan, L. Shtefan, and others.

An engineer-teacher is a specialist with higher education (HE), who carries out pedagogical, educational-production and organizational-methodological activities on professional training of future specialists in one of the branches of industry in the system of professional education, as well as qualified workers in the workplace [1]. The professional activity of an engineer-teacher includes professional-engineering and professional-pedagogical components.

The personality of an engineer-teacher has both technical and humanitarian orientation. The basis for engineering-pedagogical training is the integration, unity and interrelation of pedagogical and engineering components, as well as theoretical and practical training.

The issues of organizing the educational process have been widely discussed in the publications of specialists.

**Presentation of the main material.**

Master's degree training in professional pedagogy is one of the stages of a multistage system of providing personnel for the oil and gas industry, is a logically connected set of activities,

methods and means, the purpose of which is to develop and maintain the level of knowledge and skills of the personnel at industry enterprises and to enable their use to effectively solve production problems.

The aim of this paper is to analyze especially and summarize the scientific and technical and scientific-pedagogical results of the development and implementation of the educational program "Professional Education (Oil and Gas Business)" of another (master's) level of higher education to highlight the main aspects and factors affecting the effectiveness of higher education applicants' training and the improvement of educational programs (EP).

The task of ensuring reliable, safe and efficient operation of manufacturing equipment in the oil refining and petrochemical industry is closely linked to the issue of providing enterprises with professional highly qualified engineering personnel.

To maximize the effectiveness of the staffing system is possible only by combining the teachers' efforts of vocational universities, industry training centers, as well as scientists and industry practitioners, without their involvement the staff training remains only half realized.

One of the ways to solve the problem of ensuring reliable and efficient maintenance of equipment in the oil refining and petrochemical industry based on modern, existing approaches can be the creation of a multilevel system of staff training, one level of which should be the masters' training of professional education in the field.

The paper analyzes the experience of masters' training on specialty 015 Professional Education (Mining, processing and transportation of mineral resources) on the educational program (EP) "Professional Education (Oil and Gas Business)".

In 2013, Ukrainian Engineering Pedagogics Academy (UEPA) began training masters on the specialty 8.010101 Professional Education (Oil and Gas) knowledge area 01 Education. According to the Act of coordination for the list of specialties under which the training of applicants for higher education degree of Bachelor, Specialist, Master and the licensed volume of the Ukrainian Engineering Pedagogics Academy are organized, approved by the Ministry of Education and Science of Ukraine on November 6, 2015 №1151 (as amended by MES Order № 419 from April 12, 2016) the reallocation of licensed volume on the list of knowledge areas and specialties 2015 [2] has been performed and the masters' training began to

be conducted on specialty 015 Professional Education (Oil and Gas) knowledge area 01 Education (until 01.07.2016).

EP "Professional Education (Oil and Gas Business)" was developed in UEPA to meet the staffing needs ShebelynkaGasVydobuvannya Gas Production Division (GPD) - is the leading enterprise in Ukraine specializing in natural gas extraction, which is developing oil and gas condensate fields in the eastern part of Ukraine (Poltava, Kharkiv, Donetsk, Lugansk and Dnepropetrovsk regions), project team under the leadership of Ph.D, Kovalenko O.E., introduced the educational program since September 1, 2017.

The educational program has been designed in accordance with the internal standard of higher education of Ukrainian Engineering Pedagogics Academy, approved by the Academic Council of UEPA protocol № 15 from 27.06.2017 and put into effect by the order № 239 from 29.06.2017, the Law of Ukraine "On Higher Education" from 01.07.2014. [3], Resolutions of the Cabinet of Ministers of Ukraine from 23.11.2011. "On Approval of the National Qualifications Framework" from 30.12.2015 № 1187 [4], "On approval of the Licensing conditions for educational activities of educational institutions" from 30.12.2015. [5].

Every year it is reviewed and refined in accordance with the recommendations of potential employers, the academic community and applicants for higher education (stakeholders), as well as the experience of similar and related national and foreign educational programs to ensure the relevance of the graduates' competence and to determine appropriate matches for national regulatory framework. Thus, in 2020 the educational program was finalized in order to comply with the standard of Ukrainian higher education of the second (master) level, knowledge area 01 - Education / Pedagogics, specialty - 015 Professional Education (by specialties), approved and enacted by the Ministry of Education and Science of Ukraine from 18.11.2020 № 1435 [6].

The normative period of study on the educational program is 1 year and 4 months. The total volume of the educational program is 90 credits ECTS and includes 12 compulsory educational components - 67.5 credits and 5 elective educational components - 22.5 credits. According to the EP, the curriculum on the model form of the Ministry of Education and Science of Ukraine has been made and approved by the Academic Council of the Academy. According to the results of the professional expertise of the EP

"Professional Education (Oil and Gas Business)", the reviews from V.F. Bez'yazichny, head of the National Commission, carrying out state regulation in the field of energy and communal services NCRECS in Kharkiv region, A.P. Kurbatov, director of Kharkiv State Vocational and Pedagogical College named after Vernadsky and M.V. Korpan, the head of the learning-course industrial complex ShebelynkaGasVydobuvannya GPD have been received. For the first time there was a recruitment of applicants for the educational program "Professional Education (Oil and Gas Business)" in the specialty 015 "Professional Education (Oil and Gas Business)" in 2017. Since 2020 the recruitment and training of applicants for higher education of the master's degree educational program is carried out in the specialty 015 Professional Education (Extraction, Processing and Transportation of Mineral Resources). At present, the licensed volume of masters' training in the mentioned educational program is 85 people per year.

The aims of the educational program are the formation and development of general and professional competencies in the field of general and professional education, corresponding to the current level of engineering and technology of the oil and gas industry, considering the changing conditions, characterized by complexity and uncertainty of requirements.

The uniqueness of EP is provided by the symbiosis of knowledge, belonging to different branches: educational and oil and gas, and is confirmed by the implementation of its own scientific developments on the theoretical and methodological basis of innovative technologies application in the professional training of future teachers in the field of vocational education. UEPA is the only higher educational institution in the country, performing educational activities on EP.

The EP aims and program learning outcomes are coordinated with the positions and needs of higher educational institution and advanced oil and gas industry enterprises, where higher education applicants get apprenticeship. Close cooperation with these institutions, in particular with ShebelynkaGasVydobuvannya GPD, allows the higher education applicants to master innovative educational and industry technologies and consider the trends of the specialty development, industry and regional labor market.

EP aims are fully consistent with the UEPA Development strategy for 2015-2025 approved by the UEPA Academic Council (protocol №11 from June 24, 2015) [7] and the concept of educational

activities of higher educational institutions, as set out in the UEPA Charter., approved by Ministry of Education and Science 25.03.2016, [8].

The UEPA Development Strategy for 2015-2020 highlights that "the main mission of the academy is to meet the State's needs for highly qualified teachers-professionals for vocational schools, higher educational institutions, technical lyceums and specialized classes of secondary schools, as well as for training centers and departments of industrial training of industrial enterprises. The strategic task of the academy is to improve the quality of graduates' training to the level, ensuring the development of a professional teacher's personality, who will be able to carry out social and professional, industrial and technological, design and engineering, scientific and methodological and organizational activities in the institutions of vocational education"[ 8].

The Charter states that the purpose of educational activities UEPA "is the training of highly qualified and competitive specialists in the national and international labor market for educational institutions of vocational education and higher education, research institutions, enterprises and organizations of different sectors of the national economy to ensure social and economic development of the state by means of human capital formation"[8].

Before the EP was approved, its draft had been posted on UEPA official website [9] in order to discuss it, collect and analyze stakeholders' comments and suggestions.

During the academic semesters in communication with the students, their interests and wishes concerning organization of the educational process and content of the disciplines have been defined. For example, the applicants expressed the wish to get information about the specifics of working in the system of staffing training and retraining in the oil and gas industry in Kharkiv region. For this purpose, the meeting with Korpan M.V. (the head of the learning-course industrial complex ShebelynkaGasVydobuvannya GPD) was organized and held.

Graduates regularly participate in discussions of its development prospects. Analysis of the test results of higher education applicants and stakeholders also contributes to the accumulation of recommendations; they have been taken into consideration for EP development.

The seminars and meetings with employers to identify their proposals and discuss the goals and program learning outcomes are held on a regular. For example, at the seminar, which was held at the



Department of Thermal Power Engineering and Energy Saving Technologies (TEET) "28" April 2017, the proposals from employers, concerning the setting priorities for the content of education, compliance of the educational program to the needs of a person and society, the best global samples of their mobility and competence-oriented labor market, ensuring integration of educational and scientific activities through increasing the role of research components in the educational program, were considered.

In preparing and improving the educational program, periodic consultations with representatives of related higher educational institutions have taken place, in particular: Berdyansk State Pedagogical University.

Representatives of local governments and local authorities were involved in the process of preparing and improving the educational program. The proposals they provided were based on the results of research of the local labor market, life position, employment opportunities and implementation of personal characteristics of higher education applicants. In particular, the deputy head of education department of Roganskiy settlement council A.A. Fateeva initiated the agreement of the main professional competencies of EP graduates in the form of design, technological, organizational and managerial.

To ensure that the aims and program results of EP meet the trends in the development of the specialty, constant monitoring of the labor market concerning development of the demand for specialists in oil and gas industry and requirements for their training, the relevance of EP graduates' competence are carried out. For instance, the events together with other higher educational institutions, Kharkiv regional employment center are held.

In particular, the round tables, involving managers and teaching staff of vocational educational institutions and the administration of specialized enterprises have been held, where the trends in the development of the specialty and their impact on the results of training to meet the labor market have been discussed.

The program learning outcomes emphasize the acquisition of knowledge and skills in the development, implementation and support of the design, creation, management of technical and pedagogical systems and processes.

In formulating the goals and program learning outcomes of the EP, the industry and regional context were taken into consideration by incorporating the interests of stakeholders,

providing opportunities for students to choose appropriate academic disciplines and providing higher education applicants with assistance in implementing their own career path. Close cooperation with institutions of vocational education and industrial enterprises of the region, such as learning-course industrial complex ShebelynkaGasVydobuvannya GPD, Kharkiv State Vocational and Pedagogical College named after Vernadsky, ShebelynkaGasVydobuvannya GPD, Kharkivgas and others, allows to study the specific industry regional personnel policy and modern requirements for specialists of regional enterprises and consider them in the improvement of EP.

Sectorial and regional context of EP fully reflects the specifics and requirements of professional education field in Ukraine and the Kharkiv region, is confirmed in determining the content, selecting forms and methods of theoretical and practical training, the bases of educational services, the maximum approximation of practical training to the real working conditions. The regional context is reflected in the list and content of selective disciplines.

Defined EP program learning outcomes meet the requirements of the NPC for the eighth qualification level: the ability of a person to solve complex problems and tasks in a particular field of professional activity or in the learning process involves research and/or implementation of innovations and is characterized by uncertainty of conditions and requirements

Highly qualified personnel with scientific degrees and academic titles, having extensive experience in educational and methodological, research work and meeting the qualifications in accordance with the specialty under the licensing conditions provide implementation of the program.

Material and technical support of the educational process complies with the current standards. Lecture halls and specialized auditoriums are used for classes. The design of classrooms allows the multimedia equipment using to show demonstration materials, educational films and things like that. All laboratories have the necessary facilities, working models, benches, diagrams, technical training tools, computers, the necessary illustrations, instructional and methodological material, and handouts, providing classes at a sufficient methodological and technical level. In particular, there is a universal laboratory bench of gas distribution station, allowing providing laboratory workshops of educational components of EP, designed by graduate chair [10].

The educational process is provided with modern computer equipment with licensed software, which is an important condition for the effective training of EP graduates. This makes it possible to conduct both classroom lessons and organize students' independent work using appropriate software. Teachers actively apply elements of distance learning through Moodle system. Students and teachers of the Institute have the opportunity to use the Internet. Every student has the ability to study on the computer in addition to class time every day.

Information and educational and methodological support of EP has relevant informative content, based on modern information and communication technologies. There is an official website of the educational institution, containing information on educational programs, academic, scientific and training activities, structural units, admission rules, contacts.

Library in UEPA is the center of information support of educational and scientific process in the Academy. It is provided with national and foreign professional periodicals of the relevant or related profile, including in electronic form.

The disciplines of all cycles are 100% provided with teaching materials. All types of practices are fully provided with methodological materials. There is an electronic resource of the educational institution, containing teaching materials for all disciplines of the curriculum, including distance-learning system.

The object of study in the EP implementation are the principles, methods and means of development, implementation and support of the processes of design, creation, management of pedagogical and technical systems and processes, applying the fundamental knowledge of pedagogical science and oil and gas industry. The focus of the educational program is professional education in oil and gas industry, specialists' training for pedagogical, creative and productive, organizational and managerial and research activities with particular emphasis on innovative technologies.

The theoretical content of the subject area includes definitions, concepts, and principles of pedagogical and technical science in the oil and gas industry, corresponding to the current level of science and technology development and their usage to explain the facts and predict the results. The content of EP (such educational components as "Psychological Support of Professional Activity in Education", "Innovative Technologies in Education" (including course project), "Education Management", "Reliability and resource extension

of oil and gas industry facilities", "Innovative technologies and resource management in the field", "Modern methods of scientific research in oil and gas industry", "Design and modeling of oil and gas industry facilities" and others) corresponds to the theoretical content of the subject area

The structural and logical scheme of the educational program, as shown in Fig. 1, demonstrates the relationship of the educational components of the first, second and third semesters of training. Development of individual educational trajectory of higher education applicants is provided by:

- making up an individual learning plan, which is a working document of a student. It is made on the basis of the working curriculum and includes information regarding the list and sequence of academic disciplines, the student's course load (all types of learning activities), different individual tasks, evaluation system (current and final knowledge control, attestation of higher education applicant) (p. 3.9, 3.10. of the Provision on organizing educational process in Ukrainian Engineering Pedagogics Academy [11]);

- independent choice by applicants for higher education of EP elective components from the list at their own request;

- independent work of higher education applicants in each discipline of the curriculum on the basis of appropriate methodological recommendations;

- choosing the topics of course and diploma projects in accordance with the interests of higher education applicants, possible future place of employment (or already existing one);

- distance education system using [12], allowing the applicant for EP to study the curriculum disciplines independently, at his/her own pace and at any time, by mastering the theory and performing individual tasks;

- individual work schedule of students, allowing students to combine study with work, and acquiring experience of professional activity in addition to the training.

The order of academic disciplines choosing by students occurs in accordance with the "Regulations on the order and conditions of the students and graduate students choosing the elective courses in UEPA" [13].

Choice of academic disciplines is carried out by the higher education applicant within the limits provided by the relevant educational program and the working curriculum equal to 25% of the total amount of ECTS credits provided for this level of higher education.

List of elective courses annually is updated and approved by the Academic Council of the Academy.

According to the EP, the considered variable component of the educational program is 22.5 credits: five disciplines, internships and apprenticeships.

Elective courses are determined by the curriculum. Before the beginning of the current academic year, the Dean of the Faculty informs students about the list of elective courses (in terms of academic years / semesters), approved by the Academic Council of the Academy, which can be found on the UEPA distance learning website [12].

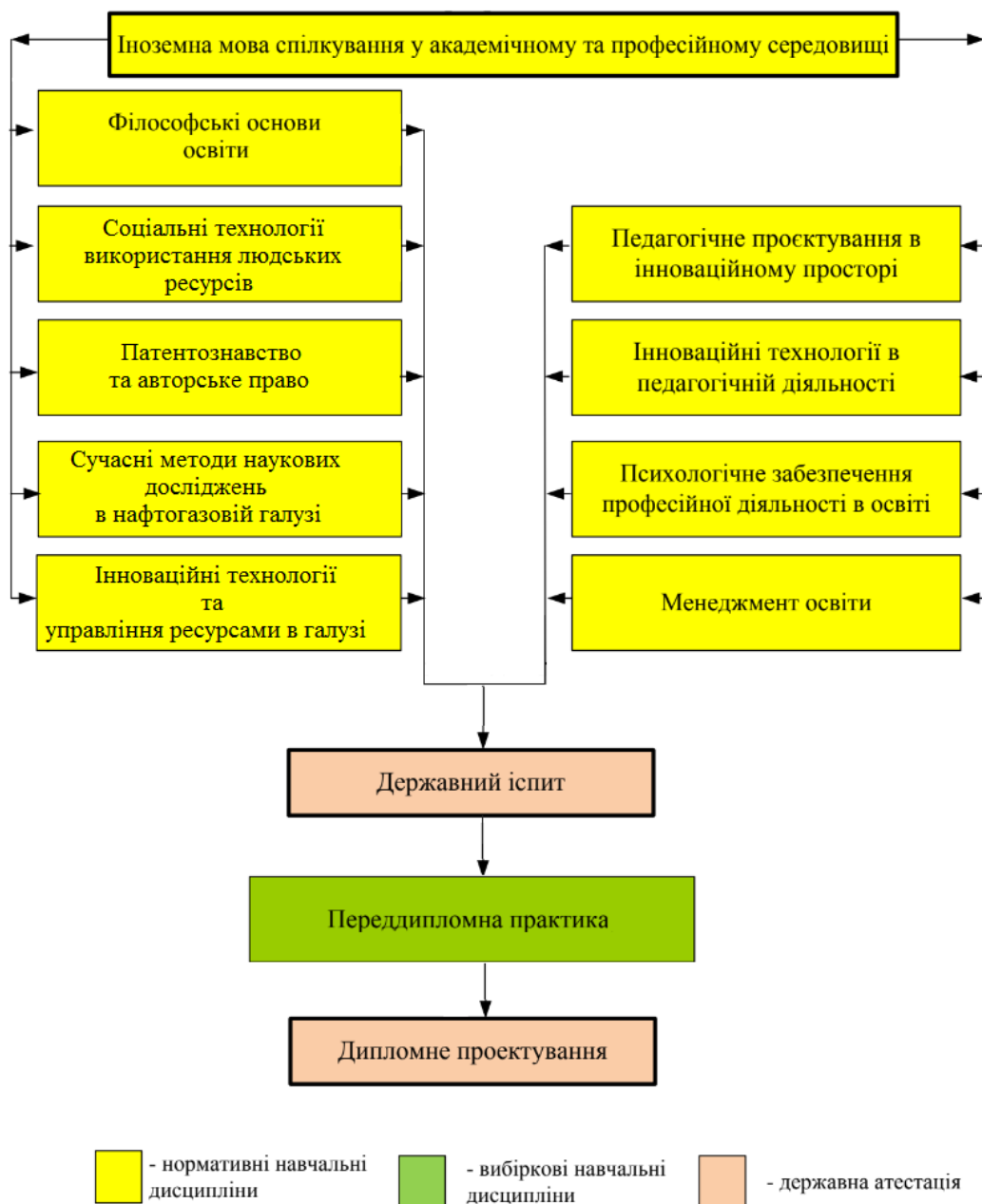


Fig.1 - Structure and logic diagram of the educational program "Professional Education (Oil and Gas Business)"

Applicants for higher education, after reviewing the proposed materials, perform a sample part of the individual curriculum of higher

education (ICHE) and submit to the dean's office their applications for study of elective courses in order to form the ICHE.

Dean's offices include the disciplines chosen by students in their ICHE, organize the work on the lists forming of academic groups (batches) to study certain elective courses and transmit the information to the educational-methodological department, bringing it to the attention of the relevant departments.

If the minimum required number of students is not enrolled for a particular elective academic discipline, the department brings to the students' attention a list of disciplines that will not be posted. The student must then choose another discipline where a quantitatively sufficient group of higher education applicants already exists or it can be formed. In the case, when re-selection does not provide the above-mentioned condition, the dean's office considers necessary to optimize academic groups.

If a student cannot enroll on time for valid reasons, he or she has the right to apply to the Dean's Office to enroll in elective courses, but no later than two weeks after the end of the enrollment process for elective courses.

After the final formation and approval of elective course groups, information about elective courses is entered into ICHE. From that moment, the elective discipline becomes compulsory course for the higher education applicant.

Practical training of EP applicants is carried out in accordance with the Regulations on the organization of the educational process in Ukrainian Engineering Pedagogics Academy [14], Regulations on the organization and implementation of students' practical training of Ukrainian Engineering Pedagogics Academy [15].

EP and the curriculum provide for the following sequence of practical training: professional-language internship in the first year in the 1st semester (three credits ECTS) and pregraduation internship (7.5 credits ECTS) and diploma project (22.5 credits ECTS) in the second year in the 3rd semester.

The dates of the practical training is determined by the schedule of the educational process of the Academy [16].

Formulation of aims and tasks of practical training, determination of its content takes place in close cooperation with employers. Most of EP applicants during the training in the master's program are employed, which UEPA fully supports. The graduating department uses the opportunity in conversations with masters to identify the knowledge, skills and abilities that are more relevant for them and their employers.

According to the survey of EP applicants are fully satisfied with the competencies gained during the practical training.

Another important direction is to provide the applicants for higher education with social skills (soft skills) during the training period, which correspond to EP goals and learning outcomes.

Developed program competencies are the first factor in the social skills formation, such as: awareness of their own role in the development of national and world culture, education and science; awareness of the importance of respecting ethical and legal standards in professional activities in educational, industrial and scientific spheres; the ability to use foreign languages in vocational activities in professional educational institutions and in the working environment.

Above-mentioned competencies promote the development of social skills. Among the educational components, forming these competencies should be highlighted: «Innovative technologies in education»; «Education management»; «Foreign language of communication in academic and professional environment»; «Professional-language internship»; «Psychological support of professional activity in education»; «Social technologies of human resources usage».

The methods and forms of training sessions, especially practical are the second factor. These methods include training sessions, business games, role-plays, cases, independent work with tasks, based on heuristic methods and others. Among the activities, contributing to the social skills development, we should highlight the independent work, project activities and educational activities.

These forms and methods of work include active interaction between applicants for higher education, which contributes to their social skills development.

In determining the approach applied in UEPA, in correlation of the volume of individual educational components of EP with the actual workload of higher education applicants, the following factors are taken into consideration as the need to match EP volume and individual educational components (in ECTS credits) to the actual workload of applicants, the achievement of goals and programmatic learning outcomes.

The teaching time of EP applicants corresponds to the requirements of the sixth section "Regulations on the organization of the educational process in Ukrainian Engineering and Pedagogics Academy" [14] and is determined by



the number of reporting units of time intended for mastering the educational training program at a certain level of higher education to obtain an appropriate degree of higher education.

The reporting unit of teaching time for a student is an academic hour (40-45 minutes), a school day (no more than nine academic hours), a week (no more than 54 academic hours), a semester (from 13 to 17 weeks), a course, a year.

Classroom weekly load on the full-time form of education for undergraduates "Professional education of oil and gas business" is the 1st academic year - 17 hours, the 2nd year - diploma project.

The unit of volume measuring of student's course load necessary to achieve certain learning outcomes is the ECTS credit. The load of one academic year is 60 ECTS credits. All types of contact (classroom) hours are balanced.

Surveys revealed the position of applicants on the sufficiency of time for independent work.

The characteristics and specificities of the educational program are taken into consideration when organizing the admission campaign for the master's program. The rules of admission to UEPA are freely available on the Academy website [17]. The Academy administration guarantees and ensures openness and transparency of the Admissions Committee.

Persons with a bachelor's degree, master's degree (specialist's EL) are admitted on a competitive basis for the second (master's) level of higher education on the program "Professional Education (Oil and Gas Business)".

The results of the general entrance exam in a foreign language and entrance tests are taken into consideration in admissions. The results of the entrance exams are evaluated on a scale from 100 to 200 credits. A person can enter UEPA for the master's degree on the basis of the bachelor's or master's degree (specialist's degree), received on another specialty, under the condition of successful passing of additional entrance examinations taking, considering the average grade of higher education certificate of Bachelor or Master (specialist).

The issue of learning outcomes recognition obtained in other higher educational institutions is regulated by the "Rules of Admission to Ukrainian Engineering and Pedagogics Academy" [17], Section VI "Procedure for accepting applications and documents for participation in the competitive selection in Ukrainian Engineering and Pedagogics Academy" and the Regulations on the organization of educational process in Ukrainian Engineering and Pedagogics Academy (Section 7. Dismissal, interruption of

training, readmission and transfer of persons studying in UEPA) [11]. In addition, UEPA relies on the Regulation on the procedure of exercising the right to academic mobility by participants in the educational process of UEPA [18].

The issue of the training results recognition, obtained in non-formal education is regulated by the Provisional Regulations on the training results recognition, obtained in non-formal education at Ukrainian Engineering Pedagogics Academy [19].

Information is guaranteed by the posting Rules and Regulations on the official website of Academy [9].

According to the "Regulations on the organization of the educational process in UEPA" [11], the educational process is carried out in the following forms: training sessions, individual activities, students' independent work, practical training, and monitoring activities. Training sessions: a lecture; practical, individual training; a consultation.

The optimal choice of teaching and learning methods is important to achieve the program outcomes (table 3 in the Appendix). Educational components are interconnected and studied in a certain logical sequence. Explanatory-illustrative and reproductive teaching methods are used to develop fundamental knowledge of professional activities, contributing to solid assimilation, comprehension of educational information, formation of practical skills and abilities to develop and improve the process, to identify typical mistakes and means of their elimination in the subject and educational spheres.

The problem-research, practical and research methods of teaching, forming the ability to analyze, systematize, design, develop innovative projects, implement non-standard approaches in the field of professional activity are used to develop creative learning and cognitive, scientific activity of students.

Independent work are applied at the students' training: in-depth study of the material from the academic literature, independent study of the training material topics, performing individual tasks, etc.

The student-centered approach includes training forms and methods that shift the focus of instruction from the teacher to the student.

In UEPA, traditional forms of learning are applied in combination with distance learning (DL) technologies [12]. The grade for the applicant's work in the K system is included as a part of the overall evaluation of the discipline.

The functioning of the system is regulated by the Regulations on Information Support of the Educational Process [20] and the Regulations on the Organization of the Educational Process of the Academy [11].

At the learning process, students interact with the teacher through the opportunity to ask questions, to consult with the unclear content of the training material, to offer the best ways to solve the problem, to choose the most interesting for the student research topic for a seminar, for a term or diploma project.

Criteria and methods of assessment, as well as grading criteria, are published in advance. Students receive feedback: they discuss assessment results; there is a procedure to appeal for students.

The Law of Ukraine "On Education" from 05.09.2017 enshrined such a progressive provision in the educational sphere as the right of participants in the educational process for academic freedom.

The principles of academic freedom are taken into consideration in writing the "Regulations on the organization of the educational process in Ukrainian Engineering Pedagogics Academy", which provides scientific and pedagogical staff to freely choose the forms and methods of learning and teaching in accordance with the principles of academic freedom. "Regulations on the order and conditions of students' choice of disciplines in Ukrainian Engineering Pedagogics Academy" corresponds to the principles of academic freedom and takes into consideration the interests of higher education applicants. These provisions are taken into account in the development of the educational program, accreditation, and curriculum.

Learning and teaching methods, applied in EP, based on the principles of freedom of speech and creativity, dissemination of knowledge and information, research and use of their results. Applicants for higher education freely choose the topics of coursework, thesis, and research. When preparing a scientific work for the competition, an applicant independently selects a research topic, prepares an abstract and a report on the conference. The results of such research contribute to an in-depth study of the educational component and are implemented in the educational process. The results of research are used in writing master's qualification works and in the further work of graduates.

Information concerning the aims, content and program learning outcomes, procedures and assessment criteria for individual educational

components are contained in the sets of information and methodological support for the study of each educational component and distance learning system.

Information is given by the teacher through oral presentation (at the beginning of mastering each educational component, before specific kinds of work, at the consultations, before current and final forms of control), in printed form (in syllabuses, freely available on the Academy website [9] and on UEPA distance learning website [12]), in complexes of information and methodological support for studying each educational component, in textbooks, lecture notes, guidelines for practical training laboratory works, independent work, workbooks for a certain discipline, sets of documents for tests, exams), in electronic form: on the site of distance learning (abstract, working curriculum, assessment criteria, division of the grading scale for kinds of work, credits for the works, teacher comments, etc., are presented for each discipline) on the department's website in the section of educational programs and specialties).

The final forms of control are reflected in the schedule of the educational process, the schedule of certification weeks. This information is provided timely to the participants of the educational process in printed and electronic form.

UEPA provides a combination of training and research in the educational program implementation in accordance with the level of higher education, specialty and goals of the educational program. EP on certain educational components provides for coursework, diploma project, requires from the students to conduct research work. In addition, applicants are involved in the implementation of student's research papers and participation in all-Ukrainian contests of students' scientific works.

Applicants carry out research independently under the guidance of leading scientific and pedagogical specialists (SPS). The results of research are reflected in individual and co-publications with the head of research (articles in scientific journals, abstracts in collections of conferences of all-Ukrainian and international levels). Every year in UEPA the students' scientific conferences are held, in which students make reports, reflecting the results of their research.

Applicants for the educational program "Professional Education (Oil and Gas Business)" take part in the Ukrainian competition of students' research papers on natural, technical and

humanitarian sciences with speciality «Oil and Gas Industry», its the second round takes place at Ivano-Frankivsk National Technical University of Oil and Gas.

The content of the EP educational components in accordance with p. 2.8.5 of the Provisions on the organization of the educational process in UEPA [11] is updated annually, taking into consideration the results of scientific achievements and modern practices. The curriculum of the disciplines in accordance with p. 3.13 of the Provision on the organization of the educational process in UEPA is also updated annually [11]. The methodological support is updated at least once in five years. The Scientific and Methodical Council coordinates methodical work in the Academy.

Based on the results of research project, dissertations, discussion of modern ideas obtained in practice and in communication with leading experts, the content of the EP educational components is updated. In particular, the results of the teachers' research of the graduating chair [21] - [23] and others, received patents, are taken into consideration in the content development of the working curriculum of the course "Innovative technologies and resource management in the industry". The results of research [24] are implemented in the discipline "Design and objects modeling of oil and gas industry".

The results of the research works have been implemented in the educational process: HE № 15-03 " Development of design and pedagogical competence of future engineers-teachers by means of educational innovations", "Theoretical and methodological basis for the implementation of innovative teaching technologies in vocational education" (№ 0118U100002) in the course "Innovative technologies in education"; № 13-14 "Technical inspection of stop valves for oil and gas production equipment", № № 14-07 and 14-39 "Conduction of a technical study of stop valves equipment for oil and gas production" in the course "Reliability and life extension of objects in oil and gas industry.

Teachers of the graduate chair actively participate in international and interuniversity conferences, have and establish relations with the neighbouring and other countries (Bulgaria, Poland, etc.) [25, [26], etc.

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The directions of internationalization activities are the establishment and development of international relations with higher education institutions, in-depth language training of students; participation in international scientific conferences, seminars, etc., are priority areas. The Academy has signed a collaboration agreement with with foreign higher education institutions; the teachers take part in international projects, in meetings with teachers of partner higher education institutions, in the project of the International Society for Engineering Pedagogics (IGIP). The majority of the graduate chair's members have the title of an international engineer-teacher.

Based on the above-mentioned analysis of scientific, technical and scientific-pedagogical results received by the authors in the process of realizing the Master's Degree Program "Professional Education (Oil and Gas Business)", the following **conclusions** can be drawn:

1. The development of a system for professional education masters' training for the oil and gas industry is an actual scientific-technical and scientific-pedagogical task.
2. Educational program "Professional Education (Oil and Gas Business)" has been developed and licensed; the successful training of masters of professional education is being carried out.
3. A number of basic scientific and pedagogical and research aspects have been taken into in preparing for the EP "Vocational Education (Oil and gas business)"
4. There was created and implemented in the educational process a sample of universal laboratory facilities for carrying out classes in special disciplines.
5. Information and educational-methodical support of educational components of EP Professional Education (Oil and gas business) have been created and implemented in the educational process.
6. The results of research works, carried out at the graduate chair have been introduced in the educational process

**Prospects for further research.** The authors consider the task of improving training in the educational program "Professional Education (Oil and Gas Business)" in the development of dual education system.

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