

ФАКТОРНЫЙ АНАЛИЗ ВЛИЯНИЯ ОБРАЗОВАТЕЛЬНОЙ СРЕДЫ НА ФОРМИРОВАНИЕ ПРОФЕССИОНАЛЬНОЙ ГОТОВНОСТИ БУДУЩЕГО СПЕЦИАЛИСТА

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Аннотация

Целью исследования является определение степени воздействия факторов образовательной среды высшего учебного заведения на процесс формирования профессиональных (Hard Skills) и социальных (Soft Skills) компетентностей будущих специалистов. Актуальность статьи заключается в определении потенциала образовательной среды высшего учебного заведения как возможности преобразования внешних педагогических воздействий во внутреннюю структуру личности, ее интеллектуальное, моральное, духовное, физическое развитие. Научная новизна статья заключается в комбинированном характере научно-педагогического исследования, поскольку работа содержит теоретические научные положения, которые касаются сущности ключевых положений исследования (образовательная среда, профессиональная, социальная компетентность, специалист и др.), а также качественные обобщения результатов факторного анализа эмпирических данных, которые получены вследствие изучения количественной характеристики влияния факторов внутренней психологической среды и внешнего образовательного пространства.

Доказано, что образовательная среда высшего учебного заведения способствует наполнению этико-эстетическими, профессионально-культурными, корпоративными ценностями аксиосферы субъектов образовательной деятельности, стимулирует групповые интересы, усиливает формальное и межличностное взаимодействие, помогает усвоению социального опыта приобретению качеств, необходимых человеку для жизни и для того, чтобы состояться в профессии, обеспечивает возможность приобретения общих (ключевых) и профессиональных компетентностей в гуманитарной, социальной, естественной, инженерно-технической сферах. Аккумуляция эмпирических данных осуществлялась в процессе наблюдения за группой студентов ($n = 925$): опросов, анкетирования, тестирования, интервьюирования. Результаты исследования целесообразно учесть в процессе построения и реализации модели выпускников высших учебных заведений.

Ключевые слова: высшее учебное заведение, специалист, образовательная среда, фактор, компетентность.

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Ամփոփում

Ուսումնասիրության նպատակն է որոշել բարձրագույն ուսումնական հաստատության կրթական միջավայրի գործոնների ազդեցության աստիճանը ապահա մասնագետների մասնագիտական (Hard Skills) և սոցիալական (Soft Skills) կարողությունների ձևավորման գործընթացի վրա: Հոդվածի արդիականությունը ներկայացվում է բարձրագույն ուսումնական հաստատության կրթական միջավայրի ներուժի որոշմամբ, որը կայանում է անձի ներքին կառուցվածքի, նրա ինտելեկտուալ, բարուական, հոգևոր, ֆիզիկական զարգացման վրա արտաքին մանկավարժական ներգրծությունների փոխակերպման հնարավորությամբ: Հոդվածի գիտական նորույթը գիտամանկավարժական հետազոտության համակցված բնույթի մեջ է, քանի որ սույն աշխատությունը պարունակում է տեսական գիտական դրույթներ, որոնք վերաբերում են ուսումնասիրության հիմնական դրույթների հությանը (կրթական միջավայր, մասնագիտական, սոցիալական իրավասություն, մասնագետ և այլն), ինչպես նաև էմայիրիկ տվյալների գործունային վերլուծության արդյունքների որակական բնդիանքումներին, որոնք ստացվել են ներքին հոգեբանական միջավայրի և արտաքին կրթական տարածքի գործուների ազդեցության քանակական բնութագրերի արդյունքում:

Ապացուցված է, որ բարձրագույն ուսումնական հաստատության կրթական միջավայրը նպաստում է կրթական գործունեության առարկաների էթիկագեղագիտական, մասնագիտական-մշակութային, կորպորատիվ արժեքներով համարելուն, խթանում է խմբային հետաքրքրությունները, ուժեղացնում է ֆորմայ և միջանձնային փոխգործակցությունը, նպաստում է սոցիալական փորձի լուրացմանը: Մարդու ապրելու և մասնագիտության մեջ մնալու համար անհրաժեշտ որակների ձեռքբերումը հնարավորություն է տալիս ստանալու ընդհանուր (առանցքային) և մասնագիտական կարողություններ հումանիտար, սոցիալական, բնական, ինժեներական և տեխնիկական ոլորտներում: Էմպիրիկ տվյալների կուտակումն իրականացվել է ուսանողների խմբի դիտարկման գործընթացում՝ հարցումներ, հարցաշարեր, թեստավորում և հարցազրույշներ: Բարձրագույն ուսումնական հաստատությունների շրջանավարտների մոլորդի կառուցման և ներդրման գործընթացում նպատակահարմաք է հաջվի առնել ուսումնակիրության արդյունքները:

Բանայի բառեր՝ բարձրագույն ուսումնական հաստատություն, մասնագետ, կրթական միջավայր, գործոն, իրավասություն:

FACTOR ANALYSIS OF THE INFLUENCE OF THE EDUCATIONAL ENVIRONMENT ON THE FORMATION OF A FUTURE SPECIALIST PROFESSIONAL READINESS

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Summary

The purpose of this study was to determine the degree of factors influence of the educational environment of the higher educational institution on the process of formation of professional (hard skills) and social (soft skills) competencies of future specialists. The relevance of the article lies in determining the educational environment potential of a higher educational institution, which consists in the possibility of transforming external pedagogical influences into the internal structure of the personality, its intellectual, moral, spiritual, and physical development. The scientific novelty of the article lies in the combined nature of scientific and pedagogical research, since the work contains theoretical scientific propositions that relate to the essence of the key propositions of the study (educational environment, professional, social competence, specialist, etc.), as well as qualitative summaries of the results of empirical data factor analysis, which are obtained as a result of the quantitative characterization of the factors influence of the internal psychological environment and the external educational space.

It has been proven that the educational environment of a higher educational institution contributes to filling the axiosphere of educational activity subjects with ethical-aesthetic, professional-cultural, corporate values, stimulates group interests, enhances formal and interpersonal interaction, helps the assimilation of social experience and the acquisition of qualities necessary for a person to live and in order to stay in the profession, provides the opportunity to acquire general (key) and professional competencies in the humanitarian, social, natural, engineering and technical fields. The accumulation of empirical data was carried out in the process of observing a group of students ($n = 925$): surveys, questionnaires, testing, and interviews. It is advisable to take into account the results of the study in the process of constructing and implementing a model for graduates of higher educational institutions.

Keywords: higher education institution, specialist, educational environment, factor, competence.

The problem: The educational environment is a subsystem of the social environment that affects the educational activity subjects through the action of various material and non-material factors. This influence can be both spontaneous, unpredictable, and expedient, organized. In the modern world, the study of the influence of educational environment on the formation of professional readiness of a future specialists is quite relevant.

A brief review of current research and publications related to the problem: The educational value of the environment was realized by the representatives of the pedagogical thought of the modern era (K. Helvetius, J. A. Comenius, J. Locke, I. G. Pestalozzi, J. J. Rousseau), modern times (J. Dewey, C. Rogers, P. Freire), contemporary (E. Carlton Parsons, D. Moore, M. Fabri) [2, 4-7]. In the current pedagogical opinion, the concept of "educational environment" is used as a compilative category expressing a structural, as a rule, external component of a certain socio-pedagogical system.

In turn, the educational environment is a multi-level, multi-component pedagogical phenomenon. Thus, in a broad sense, the educational environment is a diverse environment that surrounds a person, shapes his worldview, attitude to people, nature, and the surrounding reality. As L. Necheporenko rightly points out, environmentalism studies the whole world: the Earth, the atmosphere, the biosphere, the noosphere [10].

In the narrower sense, it refers to the national educational system as a set of educational institutions of various levels, extra-institutional institutions, in which non-formal education and adult education are implemented. Local is the environment of an educational institution that integrates the educational process, the content of educational material, and the interaction of subjects of educational activity in a certain pedagogical space. The environment of an educational institution is a small academic universe, which "remains one of the few opportunities to look ahead into the great universe of humanity, which must learn to build a new solidarity among themselves". In the narrowest sense, it refers to the internal psychological environment of an individual as a set of cognitive processes, emotions, will, etc.

The purpose of the research: the purpose of the article is to clarify the essence, structure and possibilities of the educational environment of a higher educational institution regarding the formation of certain social and professional competencies, the acquisition of which ensures the professional readiness of future specialists for the realization of a social role and professional functionality.

Research novelty: The novelty of the research consists in determining the influence of the factors of the educational environment on the formation of not only professional, but also social competences of the specialist.

Description of the main material: The research methodology is based on the theoretical analysis of scientific works in view of the raised problem, synthesis, generalization, modeling and formalization in order to formulate theoretical conclusions and prognostic provisions; empirical investigations and processing of their results, factor analysis to find out the significance of the isolated factors of the educational environment of higher education institutions on the formation dynamics of certain socio-professional phenomena of the future specialist.

The study found that the educational environment of a higher educational institution should serve as an organizational and methodological support for the development of the relevant components of the social and professional competence of a specialist, for which a set of conditions and resources should be created for training and education of students, as well as an organized sphere of professional activity of scientific and pedagogical employees.

As a local micro-society, the educational environment of a higher educational institution has the following characteristics:

- reflects the peculiarities of the social and economic systems;
- applicants for education, having the status of representatives of the temporary staff of a higher educational institution, form its variable contingent;
- scientific and pedagogical staff are also deprived of the permanent employee status, since they hold the positions held on a competitive basis;
- a higher educational institution is an accountable structure, the purpose of its activity is determined by the qualitative and quantitative parameters of the social and state order, and the content is determined by educational and professional programs, which are implemented in educational and methodological complexes of educational disciplines;
- the consequences of the activity of a higher educational institution have a remote nature, since the results of its activity can be evaluated after a certain period of time after training;
- the educational process in a higher educational institution has a number of contradictions and paradoxes, in particular, the real autonomy of a higher educational institution as an institution and the limited autonomy of teachers in choosing the content of education as the volume and structure of educational information;
- a characteristic feature of the educational environment is a system of opportunities, a set of individual forms and trajectories of applicants for education.

Summarizing the views of scientists, we characterized the model of a graduate student of a higher educational institution as a personality structure in the form of needs and abilities, values, orientations, attitudes, necessary qualities, interests and social attitudes. To the essential characteristics of the graduate model, we included social and professional competences, i.e. knowledge, skills, ways of acting, life experience, predicted personality qualities that ensure readiness for future activities, allow you to quickly adapt to certain conditions, be responsible, proactive, strive for improvement, self-realization, healthy lifestyle.

We will define social and personal professional and traits of the future specialist, which form the basis of such an integrative education as professional and social competence, the formation of which ensures readiness for professional activity, determine the level of professionalism and qualification of the specialist, the effectiveness of his interpersonal and formal communication.

We have presented the general professional competences of specialists of various profiles in the Table 1.

Table 1

General professional competences of a specialist

Competence components	Knowledge	Skills	Communication	Autonomy and responsibility
General scientific competences				
The ability to apply knowledge of the basic provisions of natural and mathematical disciplines in practical activities	Knowledge of the fundamentals of the provisions of higher mathematics, physical theories and laws, methods of researching physical phenomena, the basics of engineering and computer graphics, the basics of standardization and metrology	The ability to apply fundamental principles of higher mathematics and natural sciences during learning content of special educational disciplines by specialty and specialization of training	The ability to present the results of educational, educational and research activities, use software tools and skills in computer networks, create databases and use Internet resources	Independent assimilation of new knowledge in the conditions of innovative development
Engineering and technical competences				
Mastering the technical principles of construction, operation of machinery and equipment	Knowledge of the theoretical foundations of thermodynamics, technical mechanics and other scientific disciplines that make up the scientific basis of the relevant field, thorough knowledge of its component base	The ability to measure the parameters of various devices, to ensure automated management of samples of equipment and machinery	The ability to interact in the performance of educational and research tasks regarding the study and development of the component base, measurement of functioning parameters	Independent assimilation of new knowledge in the conditions of innovative development

Note that the content of the specialist's integral competence depends on the profile of his professional training. In the Table 1 shows examples of professional competencies of an engineering specialist, this set will be different for future humanitarians.

We presented the social competences of the specialist in the Table 2.

Table 2

Competence components	Knowledge	Skills	Communication	Autonomy and responsibility
Social competence of a specialist				
The ability to participate in the activities of democratic institutions of society	Knowledge of current legislation, legal framework, political literacy	The ability to defend one's own position, correct one's mistakes, the ability to understand the flow of political information	The ability to defend one's own position, correct one's mistakes, the ability to understand the flow of political information	Adequate assessment and responsibility for the state of one's own health, life and health of subordinates, peaceful citizens
The ability to exist in a social environment	Knowledge of the scientific foundations of the theory of decision-making, current legislation, regulatory acts, the foundations of philosophy, sociology, political science, economic theory, the culture of	The ability to make managerial decisions in standard and non-standard situations, manage engineering and technical, economic	Communicability, the ability to organize functional-role, interpersonal interaction, tolerance, the ability to criticize and self-criticize, to systematically understand problems, the ability	<i>Competences related to the person himself as an individual, a subject of activity: understanding and ethical norms of behavior, the</i>

	Ukrainian and foreign languages, the history of Ukraine, knowledge and observance of the rights and freedoms of a citizen of Ukraine, the rights and duties of an official	activities, conduct individual and group educational work, actions to strengthen labor discipline and law and order, unite production teams, predict and resolve interpersonal conflicts	to communicate with people: verbally, in writing, in the form of dialogue and conversation, the ability to forecast the development of interpersonal relationships in production teams	ability to learn, to carry out personal and professional self-development, improvement. <i>Competences related to the social interaction of a specialist with the social sphere, the production team: the ability for effective professional activity in the position of a manager and a subordinate</i>
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We can present the social qualities of a specialist as a consequence of the joint manifestation of such professionally important moral-ethical and emotional-volitional qualities of an individual, such as: 1) empathy; 2) delicacy, tact, attentiveness to the recipient of the service; 3) tolerance; 4) endurance and patience (control over one's own emotions when provoked by irritation, aggressiveness, etc.); 5) high spiritual culture and morality, ethical behavior, humanity, mercy, sensitivity, selflessness; 6) honesty; 7) objectivity and fairness; 8) moral purity in professional affairs, confidentiality; 9) decency, responsibility; 10) emotional and positive attitude towards people: benevolence, kindness, love for people, optimism.

As a rule, indicators of the formation level of these qualities are difficult to formalize or are not formalized at all, do not lend themselves to mathematical processing and derivation of universal laws. As an example of an attempt to derive the regularities of the ways of human existence, which set the general parameters of life, the sensory and mental experiences of an individual, which are determined by the existential of human existence, the free choice of the individual, which is determined by a complex of external and internal factors of the environment, it is possible to propose the formula of "personal identity" (E. Erikson), "self-actualization" (A. Maslow), "authentic expressiveness" (A. Waterman), "personal expressiveness" (M. Seligman).

As the analysis of the given "formulas" shows, the formation of both professional and social characteristics of a specialist largely depends on the conditions of both the internal (psychological) and external (educational) environment. In the scientific literature, there are numerous proposals regarding the structuring of the educational environment of higher education institutions. Given the results of V. Ilyina's research [3, p.11-13] and our own work [5], we will distinguish organizational-management, content-procedural, communicative, technological components in the educational environment.

In particular, the organizational and management component of the educational environment provides effective management of the educational and professional process, the participation of subjects of educational activity in the work of educational and methodological work, the organization of educational and scientific training, scientific, social and humanitarian, educational and social and psychological work, international cooperation, personnel support, institute of postgraduate education, creative teams, implementation of programs of educational, cultural and scientific cooperation with other higher education institutions and institutions. It is about the forms and methods of organizing educational activities that ensure the practice of applying the skills of professional activity. In this direction, independent research with the subsequent presentation of the results to the group, classes on the formation of time management skills, conflict resolution, cultural issues and self-actualization are effective.

The content-procedural component of the educational environment, first of all, ensures the formation of professional competences, which are provided by educational and professional programs for the relevant specialties and specializations. The development of social skills is provided by in-depth study of foreign languages, social and humanistic educational disciplines, psychology, pedagogy, etc. The introduction of relevant educational disciplines to the educational and professional programs, the orientation of the teaching methodology of mandatory and optional components to the development of the student of higher education as a competitive graduate, the expansion of his

worldview thanks to attending classes from the relevant courses and electives, reading professional and fiction literature are relevant.

The communicative component of the educational environment is aimed at creating a comfortable moral and psychological atmosphere through the coordination of formal and interpersonal interaction based on the implementation of the principles of the rule of law, mutual respect, tolerance, the organization of the work of student self-government and parliament, the involvement of students in active public and volunteer activities, participation in sports competitions, which primarily contributes to the formation of social skills. It is also about bringing the understanding of the importance and benefits of having social interaction skills to the students of higher education by scientific and pedagogical staff.

We will supplement the given structure of the educational environment of higher education institutions with a technological component, which involves the organization of an information field in which computer management of educational activities is carried out on the basis of a person-oriented approach, by creating a database that corresponds to the individual educational trajectory of the applicant for education. In the mode of flexible, transparent, standardized dialogue with the computer, the user acquires the skills of productive search and gathering of information, the ability to think logically and critically, make independent decisions, "creatively", self-organize.

The research uses empirical data that were obtained as part of the research. 925 Ukrainian and Polish students were included in the sociological study, which was conducted jointly by Kharkiv National University named after V. N. Karazin (Kharkiv, Ukraine) and Zelenogura University (Zelena Hura, Poland). The random nature of the sample guarantees its representativeness. The dominant socio-demographic characteristics of the respondents are orientation towards future professional activities, the financial status of a young person, which consists either in the need to work to pay for education, or in financial support from the family, or the possibility of receiving additional income in the form of a scholarship [1, p. 5-6].

To analyze the significance of the factors of the educational environment with regard to the formation of professional and social competence, the following indicators were studied: the accumulated percentage of the variance of the factors, which determines how completely it was possible to describe our data set with the help of selected factors – the higher this indicator, the larger the data set succeeded in factoring; the percentage of total variance indicates the significance of the factor – the greater the percentage of variance explained by the factor, the more significant it is and the more variables it includes. So, with the help of factor analysis, it is possible to establish which of the educational factors is the most significant, for which the analysis of the eigenvalues of the factors is used. Eigenvalues are variances explained by factors [8, p. 45].

Before conducting the research, the empirical data was checked according to the Kaiser-Meyer-Olkin criteria (the criterion in this case equals 0.652) and Bartlett's sphericity (in this case equal to 0.00), which indicates the admissibility of using this method. Thus, in order to study in more detail the relationships between the "multipliers" of professionalism and the conditions of the internal and external educational environment of higher education institutions, we used the data of factor analysis.

According to the results of the analysis, 4 factors were singled out, which explain 73% of the variance. Thus, the first factor (22% of variance) covers a group of factors of the educational environment of a higher educational institution, which are related to the orientation of students to future activities (in order of significance, these factors are: the desire to secure a professional career, to better prepare for future activities, to become a highly qualified specialist, taking into account success in the employment process).

The second factor (22% of the variance) is formed by factors that are related to logic and coercion external to the educational environment of a higher educational institution, in particular, requirements from the institution of the family (parental control, the desire not to stand out among peers due to their academic performance, economics (salary, which is paid for training.) We associate this factor with the formation of the ability of future specialists for effective social communication.

The third factor, which explains 14% of the variance, combines motives related to the control of the quality of education and coercion in the form of orientation towards the accumulation of "capital" of success: consideration in the process of awarding scholarships, employment.

The least important among the given factors (about 14% of the variance) is the factor that integrates the factors most homogeneous to the educational environment of a higher educational institution, namely: interest in academic disciplines and demandingness of teachers. It is this factor that determines the recorded combination of aspirations for the incorporation of cultural capital with its subsequent institutionalization.

Conclusions: The results of the study [1, 8, 9] proved that the orientation to future professional activity is not determined by any ascriptive status of a higher education student (gender, place of residence before entering a higher educational institution, parents' education, family financial status). In students whose motivation is characterized by the first factor, quite clear professional status harassment can be traced, since they more often plan to engage in

practical activities in their specialty after graduation (the coefficient of conjugation is significant, the strength of the connection $p=0.275$) or scientific research activities (the coefficient of conjugation is significant, strength of connection $p=0.199$), or teaching activity (coefficient of conjugation is significant, strength of connection $p=0.187$). Such students spend a relatively significant amount of time preparing for daily classes (the coefficient of conjugation is significant, the strength of the relationship $p=0.201$) and exams (the coefficient of conjugation is significant, the strength of the relationship $p=0.217$). They demonstrate high academic success (the coefficient of conjugation is significant, the strength of the connection $p=0.339$).

According to the results of the research, students who are motivated by external to the educational environment of control came from families with a higher income level (the coefficient of conjugation is significant, the strength of the connection $p=0.101$). The objectified cultural capital of their families in the form of a home library is lower than that of their peers (the coefficient of conjugation is significant, the strength of the connection $p=-0.153$). After graduation, students who are motivated by this type of motivation, more often than their colleagues aspire to occupy high administrative and management positions. However, it should be noted that their sufficiently high level of professional and status demands is not manifested either in the form of intensive educational practices, nor in the desire to master a foreign language, nor in the consequences of academic success.

Applicants for higher education who are motivated by the desire to achieve high academic performance are more likely to come from families with little wealth (the coefficient of conjugation is significant, the strength of the connection $p=0.141$), who live in small cities or rural areas (the coefficient of conjugation is significant, bond strength $p=0.155$). Such young people try to devote more time to preparing for classes than students who are dominated by motivational factors of external extra-academic coercion. The authors note that quantitatively these practices translate into sufficiently high marks. However, their academic performance differs for the worse in comparison with students who are oriented towards successful professional activity.

According to the results of the research, motivation, which is determined by interest in academic disciplines and demandingness of teachers, affects the desire to engage in pedagogical activities and contributes to achieving sufficiently high academic success.

The results of the study are shown in the Table 3.

Table 3
Factor loading of professional motivation of higher education applicants

	Factors			
	1	2	3	4
The desire to secure a professional career	0,866	0,140	-0,035	0,040
The desire to better prepare for professional activities, to become a highly qualified specialist	0,863	-0,042	-0,101	0,150
Consideration of success in future employment	0,654	0,247	0,443	-0,035
Parental control	0,088	0,817	0,115	-0,086
The desire not to stand out among peers with one's academic performance	0,071	0,805	-0,026	0,092
Tuition fee	0,093	0,701	-0,472	-0,046
Taking grades into account when calculating scholarships	-0,004	-0,072	0,894	0,102
Demanding teachers	-0,062	0,213	0,208	0,809
Interest in academic disciplines	0,263	-0,263	-0,086	0,725

Therefore, by means of factor analysis, it was established that the determining factors of the influence of the educational environment on the formation of the professionalism of the future specialist are the orientation to the future special activity and the external control of success by extra-institutional institutions. Unfortunately, the second factor reduces the academic success of higher education students, leads to the formation of their attitude to the educational process as a forced type of activity and the educational environment as an alienated space in which subjectivity is lost.

Summarizing the results of the research, we will highlight its theoretical and practical significance. First, the educational environment is a complex system object, it exists as a social space where the educational and professional activities of students and teachers are organized, and formal and interpersonal interaction develops between them. Secondly, the educational environment is not only a set of conditions, but also a means of achieving educational goals. Thirdly, the educational environment is a multi-component entity that includes spatial and temporal localization, a system of psychological and didactic components, and is a model of a professional environment in which the socio-

professional phenomena of a specialist will be realized. From these positions, the educational environment of a higher educational institution can be characterized as a set of factors and conditions for the socialization and professionalization of the individual, the formation of professionally important qualities, namely empathy, self-organization, vitality, discipline, responsibility, the ability to act in a situation of uncertainty according to requirements and instructions.

The educational environment as an educational phenomenon, as well as its structural components (organizational-management, content-processual, communicative, technological) should contribute to the formation and improvement of the professional and social characteristics of the future specialist.

Using the factor analysis procedure, the most influential factors of the educational environment of a higher educational institution in the context of the formation of professional and social competences are singled out. Based on quantitative indicators (dispersion), qualitative conclusions were made regarding the influence of factors in order of importance: 1) a group of factors of the educational environment, which are related to the orientation of students to future activities (22% of the variance); 2) factors that are related to external factors relative to the educational environment of higher education institutions (22% of the variance); 3) factors of material interest (14% of variance); 4) factors most homogeneous to the educational environment of higher education institutions (14% of variance).

It should be noted that the organization of the educational process in a modern higher educational institution should take into account that the formation of its professional and social skills should take place in parallel. The future specialist is expected not only to be highly qualified in the profession (so-called Hard Skills), but also to have developed communication skills, the ability to present oneself, to agree and negotiate, to have high writing skills (i.e. Soft Skills), the foundations of which must be laid in an educational environment higher educational institution.

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