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Developing consulting competence in the digital educational space: An experimental study in higher education

Desarrollo de la competencia de consultoría en el espacio educativo digital: un estudio experimental en la educación superior

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Abstract

The concept of "consulting" and its application in educational settings are explored, along with the functions performed by consulting in the educational sector. The effectiveness of information technologies in consulting activities is proven. A new type of consulting in the consulting services market is considered – information

technology consulting. The main goals of modern information technologies in consulting activities are revealed. The main tasks of modern information technologies in consulting activities are grouped. The main components of the application of modern information technologies and the main tasks of consulting service specialists are identified. The content of applied information, digital technologies, and ways of their application in consulting during distance learning are revealed. The experimental study was conducted by a specially developed program based on the methodology for forming consulting competence in the modern information educational space of future specialists in the process of professional training. The experimental data obtained on positive changes in the formation of consulting competence, its components in future specialists, give grounds to speak about the effectiveness of the experimental methodology in the process of professional training.

Keywords: consulting competence, information digital technologies, educational industry, consulting services, management competence.

Resumen

Se revela el concepto de "consultoría" y el contenido de las actividades de consultoría en educación; se consideran las funciones que desempeña la consultoría en el sector educativo. Se demuestra la eficacia de las tecnologías de la información en las actividades de consultoría. Se considera un nuevo tipo de consultoría en el mercado de servicios de consultoría: la consultoría en tecnologías de la información. Se revelan los principales objetivos de las tecnologías de la información modernas en las actividades de consultoría. Se agrupan las principales tareas de las tecnologías de la información modernas en las actividades de consultoría. Se identifican los principales componentes de la aplicación de las tecnologías de la información modernas y las principales tareas de los especialistas en servicios de consultoría. Se revela el contenido de las tecnologías de la información aplicadas y digitales, y las formas de su aplicación en la consultoría durante la educación a distancia. El estudio experimental se llevó a cabo de acuerdo con un programa especialmente desarrollado, basado en la metodología para la formación de competencias de consultoría en el espacio educativo de la información moderna de futuros especialistas en el proceso de formación profesional. Los datos experimentales obtenidos sobre los cambios positivos en la formación de la competencia de consultoría y sus componentes en los futuros especialistas permiten hablar de la eficacia de la metodología experimental en el proceso de formación profesional.

Palabras clave: competencia consultora, tecnologías de la información y digitales, sector educativo, servicios de consultoría, competencia gerencial.

Introduction

In the modern education system, transformations and global changes are taking place due to the constant adaptation of a person to the conditions of the external environment. The development of the educational sector is carried out under the influence of such social, economic, and technological transformations that are constantly taking place in the global educational space. That is why traditional education cannot fully meet the needs of society and is unable to respond promptly to acute problems that arise in the world.

The active development of a modern digital society in the world necessitates the use and implementation of consulting in the educational sphere at a professional level, which contributes to the provision of high-quality educational services, contributes to the development and support of an educational institution, and ensures the quality of education. One of the most important conditions for the successful functioning of educational institutions is their ability to develop rapidly in the conditions of a progressive market and global changes.

Educational institutions, to maintain their vital activity, are forced to restructure, introduce innovative technologies, constantly evolve, and improve, which requires knowledge and skills, and a lot of effort from management personnel. At the current stage of development of society, it causes complications of socio-economic processes; therefore, there is a need to transfer skills, experience, knowledge, and methods of management of economic relations to an independent sphere, which in turn contributes to the formation of the international and national consulting market. (Drahunova, 2023).

Therefore, ensuring high-quality consulting activities in the modern information educational space is a relevant requirement today all over the world, because today the reform of the education system is aimed at ensuring the compliance of the quality of professional education with the needs of the country's development and the demands of modern life. In this process, consulting services play an important role in the field of assessing the quality of education.

Literature Review

The theoretical foundations of consulting practice, the institutional structure of the global market, and the specifics of the functioning of its various segments, the formation of the global competitive environment, and key trends in the development of the global consulting market are revealed in the works of various domestic and foreign scientists.

Analysis of scientific literature on the content and essence of the concept of "consulting", ensuring high-quality consulting activities in the modern information educational space, makes it possible to assert that many scientists have studied this issue. The essence of consulting activities in a higher education institution is revealed by Drahunova (2023). A scientific and theoretical analysis is carried out, and the main requirements for the implementation of consulting activities in a higher education institution are determined. The main functions of consulting are highlighted, and the areas of cooperation between higher education institutions and consulting companies are characterized. In the modern educational activity of a manager of a higher education institution, the importance of management consulting has been proven, especially in the context of global challenges, such as mobility, internationalization, diversification, democratization, etc. The essence of consulting management in education is revealed, which is a reliable mechanism for meeting the needs of subjects of educational activity of a future specialist, aimed at improving the quality of management activities and ensuring the competitiveness of higher education institutions.

Research by foreign and domestic scientists and practitioners is devoted to the issues of consulting practice, in particular, the development of consulting practice, consulting methods and techniques, as well as the marketing of consulting services. The definition of consulting as a specific type of joint intellectual activity of the client and the consultant is given by Khomenko (2020). The consulting function consists of identifying and analyzing the set of management tasks; assisting in solving management problems; developing proposals for solving management tasks; in monitoring the effectiveness of the implementation of proposals and necessary practical measures. The content of the consulting component in the management of an educational institution is revealed by Chepurenko (2024). The researcher, in the conditions of public-private partnership, showed the influence of educational consulting technologies and management consulting on the efficiency of managing a vocational education institution; identified the types of consulting that must be used in the process of implementing projects and developing public-private partnership projects. It is shown that the consulting competence of the head of an educational institution will affect the quality of the application of public-private partnership technologies and the development of the educational institution itself.

Finding ways to solve the problems of consulting practice is given considerable attention by specialists in the field of automation, creation, and implementation of information and communication technologies in education, pedagogy, and psychology, theory and methodology of teaching computer science, who highlight valid opinions on this problem in their works. In particular, scientists Holovnia et al. (2023) see the consulting component in the management of an educational institution in connection with digitalization, which is a direction of development that is mandatory for any sphere of human activity in the modern world. Scientists have characterized the process of digitalization in higher education institutions, identified the main problems that arise, and the impact of the digitalization process on teaching activities. It is noted that the formation of digital competence of teachers and increasing the insufficient level of technical support, the gap between students and teachers in technical support, and eliminating ignorance of the potential capabilities of various digital tools significantly reduces the effectiveness of the educational process and requires active support from the administration of educational institutions.

In turn, scientists from Latin American countries consider the problem of consulting practice in the information space and draw attention to the importance of innovative technologies in this practice. According to scientists from Latin American countries, attention is focused on the need to use innovative technologies throughout the educational process, which will allow the formation of a high information culture of the world's youth. The formation of innovative technologies in consulting activities in the information space requires, first of all, a high level of information culture and methodological literacy of the specialist.

In the work Caramori (2016) presents part of the results of a research with a qualitative approach grounded on the participatory and interpretative perspective. It aims to offer regular and special education teachers in service continuing training on the collaborative consulting approach.

Scientists Gerlin et al. (2019) revealed the information literacy learning program: networks of collaboration between people working in information, educational, and cultural spaces.

The aim of the article by Zattar et al. (2024), is to shed light on the concept of information education from a terminological and conceptual perspective. To this end, the article examines the understanding of the term “information education” in the field of information studies from a linguistic perspective. This discussion examines the social perspective of information to the extent to which education can contribute to critique.

However, the issues of designing web-oriented information systems for managing the educational process of a university and their systematic implementation and use in the information, educational, and scientific environment of higher education institutions remain insufficiently developed.

Theoretical analysis of the current state of scientific research and practical aspects of the use of ICT for the organization and management of consulting practice indicates the presence of contradictions between:

- The objective need of society to update the educational process management system to improve the quality of training of future specialists in consulting practice, and the insufficient development of its conceptual, scientific, and applied provisions;
- The rapid growth of the influence of information technologies on all ongoing processes, and the lag of theoretical and methodological research on the systematic use of ICT tools in consulting practice;
- The available technological capabilities of using modern information and communication technologies to support the educational sphere, in particular web-based and cloud-based technologies, and the insufficient readiness of participants in the educational process of higher education institutions for their scientifically based, pedagogically balanced, and effective use;
- The significant didactic potential of using information systems in Consulting practice, and the lack of theoretically based models and effective methods for their design and implementation.

At the same time, the problems of consulting services are not comprehensively covered and remain poorly researched, and their solution is often limited to practical recommendations, so many issues are not considered and require study in both theoretical and applied aspects.

Yes, there is no research focused on studying and improving the conceptual foundations of marketing consulting services, which would ensure the success of market activity.

The key characteristics of the concept of partner marketing are most capable of ensuring the achievement of such important factors of effective consulting practice.

Therefore, focusing on the importance of consulting practice in the information space is necessary for the formation of an appropriate mechanism of affiliate marketing.

Thus, the range of relevant factors for the effectiveness of the developed methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training is outlined. All this led to the choice of our article.

Research purpose. To prove the effectiveness of the developed methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training.

Methodology

The methodological principles of the study are: leading provisions of the theory of scientific knowledge; general scientific principles of historicism, systematics, scientificity; conceptual provisions of pedagogical, psychological, sociological sciences; ideas of experience based on the synchronous study of pedagogical, socio-cultural and economic phenomena; philosophical and pedagogical ideas of the development of modern information education.

To achieve the set goal, the following research methods were used: theoretical: systematic and targeted analysis of the literature – in order to clarify the conceptual apparatus of the study and compare different scientific views on the problem of the formation of consulting competence; generalization of the practice and theory of professional training of future specialists in order to identify the features of the formation of consulting competence in them; empirical: pedagogical targeted observation of students' activities in the learning process during the study of professional disciplines; diagnostics (questionnaire, interview, survey) – to assess the levels of formation of students' consulting competence; pedagogical experiment – to verify the effectiveness of the developed methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training; statistical – to establish the exact reliability of the experimental results obtained.

The implementation of the pedagogical experiment was carried out in three stages: preparatory, main, and final.

At the preparatory stage, the purpose and objectives of the study were determined, the experimental plan was developed, methods of measurement and processing of the results were identified, control and experimental groups were selected, and their homogeneity was checked.

At the main stage, the experiment was conducted.

At the final stage, the results of the experiment were analyzed, their reliability was confirmed, and conclusions were drawn about the pedagogical effect of the experiment.

The reliability and validity of the obtained results, the objectivity of their assessment were ensured by the methodological justification of the initial positions and the qualimetric mechanism for assessing the quality under study, the use of a complex of complementary research methods, and the involvement of a group of respondents from a higher educational institution in the analysis of its results.

To assess the homogeneity of the experimental and control data collection, statistical processing was carried out using MS Excel and SPSS (Statistical Package for Social Science) programs.

In our article, we used quantitative methods of data analysis. This group of empirical research methods includes methods of obtaining information about the object under study that allow identifying its quantitative characteristics.

When determining the sample of subjects, the general specificity of the research subject was taken into account. The total sample size was 90 subjects. EG included 48 students, CG – 42 students. A representative sample was made up of parallel control groups and experimental groups in the study. When

forming the sample, the criteria of content, representativeness, and equivalence were taken into account. The sample was formed by random selection using the technical procedure of calculating the selection step.

The experiment was conducted in Professional Pedagogical Specialty College of Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Oleksandr Dovzhenko Hlukhiv National Pedagogical University, Central Ukrainian National Technical University. The conduct of the experiment is permitted by the scientific councils of the universities in order not to violate ethical considerations in institutions of higher education.

The experimental research program included the following actions: outlining the tasks of the experiment for a specific purpose; determining the time and place of the experiment, its volume; characterization of the groups and sample involved in the experiment; description of the methodology for experimenting; description of the materials for experimenting; characterization of the variables influencing the results of the experiment; description of the interpretation and processing of the results of the experimental study.

The pedagogical experiment to verify the effectiveness of the developed methodology for the formation of consulting competence in the modern information educational space of future specialists was carried out in three stages: preparatory, practical, and final.

Methods of probability theory and mathematical statistics were used as the basis for processing the results of the experiment, in particular, the calculation of Student's t-criterion.

We were guided by the basic provisions when choosing diagnostic methods regarding reliability, validity, objectivity, and pedagogical measurements.

The confirmatory experiment conducted using interviews with students, questionnaires, and statistical processing of the results made it possible to state that at the 97% level, the difference between the probability samples of the confidence interval, which were the control and experimental groups, is within 5% and is statistically insignificant, i.e. the difference between the estimates of the levels of formation indicates an almost identical general level of formation of consulting competence in the modern information educational space of future specialists of the control and experimental groups (28% of EG respondents and 30% of CG respondents showed a low level of consulting competence, which made it possible to determine methods for increasing consulting competence in the modern information educational space of future specialists and to develop a methodology for the formation of consulting competence.

The formative experiment in the implementation of the methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training contributed to a qualitative change in the indicators of the phenomenon under study in the experimental groups.

The obtained experimental data on positive changes in the formation of consulting competence, its components in future specialists, give grounds to speak about the effectiveness of the experimental methodology in the process of professional training.

Using the methods of mathematical statistics, the confirmed generalization of the results of the pedagogical experiment, in particular, its formative stage. Student's t-criterion showed significant differences in the levels of formation of consulting competence of future specialists in the process of professional training in qualitative and quantitative indicators.

Results and Discussion

The content of concept of "consulting" and the content of consulting activities in education, functions performed by consulting in the educational industry.

Effective consulting activities in education are a reliable mechanism for ensuring the competitiveness of educational institutions and meeting the needs of subjects of educational activity, aimed at improving the quality of management activities in modern educational institutions.

As an organization of management activities, consulting activities are characterized by four positions in education. Let us reveal these positions:

1) Work in an educational institution as a whole (type of institution, operating mode, mission, strategy);
2) Activities of subjects of the educational process (technologies of the educational process, design of activities, scientific activity, workload, advanced training of specialists);
3) Work of applicants for the educational space (taking into account the individual characteristics of the student, level of education);
4) Management structures (technologies, design of activities, functions, organizational structures).

Consulting management is not fully implemented in the higher education system, which necessitates the design of the outlined activities. The subjects of educational consulting activities in the management of socio-pedagogical systems and the general theory of management are managerial, pedagogical employees of higher education institutions, scientific and pedagogical personnel, and public organizations that participate in the design, development, implementation, and application of educational consulting. The object is the activity of managerial, pedagogical, scientific, and pedagogical employees with the use of educational consulting, that is, consulting educational activities without which the existence of higher education institutions is impossible (Drahunova, 2023).

Let us describe the diverse functions performed by consultants in the educational sector. Among them, the most significant are:

- **Scientific function** – contributes to the dissemination of promising management experience and modern scientific achievements;
- **Consulting function** – assists in the analysis and identification of set management tasks; implementation of necessary practical measures; solution of certain management problems; development of proposals for their solution; monitoring the effectiveness of the implementation of proposals (Khomenko, 2020);
- **Intermediary** – search and selection of business partners, establishment and identification of connections with subjects of cooperation; for investment in the activities of an educational institution, identification of useful objects of cooperation;
- **Research** – identification of patterns, factors, and factors that have a direct impact on an educational institution;
- **Educational** – improvement of professional qualifications of specialists, formation of management experience and new skills in them to ensure the development of consulting competence (Skrypnyk, 2021);
- **Social function** − ensuring the interaction of elements of the social system in the context of the development and formation of the human resources potential of society, scientific, intellectual, technical innovation, mutually beneficial and long-term cooperation between educational institutions and private enterprises;
- **Managerial function** − ensuring the functioning of the management infrastructure and its organization in education; ensuring the implementation of an effective management cycle, forming the basis for making appropriate management decisions;

- **Communicative function** − ensuring appropriate interaction with participants-partners of the educational process;
- **Epistemological function** − understanding the patterns of development and functioning of the partnership, which is what consulting activities in education are focused on, to develop appropriate recommendations;
- **Practical and applied** − providing partners in consulting activities in education with recommendations that, through the adoption of certain management decisions, contain measures to achieve the corresponding common goal;
- **intermediary function** − identifying promising objects of cooperation in the educational system, selecting business partners, providing consultations (Díaz et al., 2015).

Types of consulting in the implementation of educational consulting in the management of educational institutions.

Educational consulting in the management of an educational institution is implemented by types of consulting that will ensure the effective organization of the educational process:

- Evaluation consulting, manifested about a specific enterprise in assessing the feasibility of partnership activities, the rationality of risk distribution between partners and resources, prospective and real demand for employees in the labor market;
- Diagnostic consulting, helps to identify the nature and causes of various problematic situations regarding the provision of human resources to the educational process, the introduction of innovative teaching technologies, the possibility of developing the human resources potential of an educational institution, the material, technical and financial capabilities of the educational institution to implement a partnership project;
- Expert consulting allows for the elimination and identification of inappropriate educational and management technologies to carry out a full or partial examination of the implementation of the partnership project, as well as for the introduction of innovative technologies into the partnership project (information and communication, new educational, and innovative technologies);
- Methodological consulting, focused on the development of specific methodological recommendations, the implementation and preparation of certain methods of managing educational institutions under partnership conditions;
- Psychological consulting helps the head of an educational institution, provides a favorable psychological climate of partnership;
- Corrective consulting provides the head of an educational institution with the competence to analyze management situations, implement adaptability and flexibility of management decisions, and select management mechanisms by joint partnership activities (Plakhotnik et al., 2022).

Educational consulting and its management component at all stages of the partnership project are important tools for quality education. It is based on consulting competence, the use of consulting technologies by the manager, which contributes to the practical implementation and understanding of consulting services, the ability to organize management activities with the involvement of experts, conducting and independent assessment of cooperation of a management audit of an educational institution with a private partner (Chepurenko, 2024).

Information technologies in consulting activities.

Today, a new type of consulting has emerged in the consulting services market – information technology consulting. All services for this type of consulting are quite promising, due to the growth in demand for information technology and information technology.

Let's reveal the main goals of modern information technologies in consulting activities:

- Dissemination of knowledge, information about best practices, new technologies, educational achievements, and market conditions;
- Solving several technological problems in consulting services or directly at enterprises that could not be solved earlier due to the lack of computer technology;
- Using the capabilities of the Internet, ensuring access of educational institutions to electronic information sources;
- Automation of the activities of consulting groups;
- Operational exchange of information between consultants and students via e-mail (Crysdian, 2022).

Let's reveal the main goals of modern information technologies in consulting activities: organizing monitoring, creating conditions for the effective functioning of the market, providing information support on issues of professional activity, and forecasting market conditions.

According to applying modern information technologies, the main tasks of consulting services specialists are to create and develop a system of information support for participants in the educational process, the main components of which should be:

- Distribution, systematization, and formation of information resources to ensure the conditions for transparency of the educational environment;
- Support and development of distributed business data banks of professional information;
- Systematization and development of computer technologies of information support, in particular, on issues of analysis, accounting, planning, reporting, and document flow;
- Support and development of automated workplaces of specialists;
- Adaptation of systems that provide electronic information interaction of market formations with consulting structures (Lai et al., 2024).

Consultant specialists must be fluent in the main typical software packages for working on personal computers and be able to navigate modern information systems.

For effective consulting activities, special attention should be paid to the creation and maintenance of market information of regional databases, scientific and technical. These databases should become a fund that is reference and informational and contains scientific, technical, and market information – retrospective (archive), current (operational), prospective (forecast), and meet the following user requirements:

- Be updated promptly;
- Be a means of disseminating information operationally;
- Provide access to the information contained in it in an easy form;
- Include general-purpose information resources – information for general use (legislative, regulatory, and other) (Lahav et al., 2020).

Applied information, digital technologies, and their application in consulting in distance learning.

In consulting, applied information technologies include technologies that solve applied problems of information support of educational activities. These technologies will provide personnel training, information support of an educational institution, automation of management accounting, automation of accounting, dissemination of scientific and technical information, etc.

The limited time of students is one of the most difficult aspects of conducting training in consulting, as well as the high cost of educational activities, which is associated with the costs of food, accommodation, and transportation costs, etc. Therefore, the consulting service is constantly looking for new opportunities in the provision of educational services. Distance learning is an effective method of learning in such a situation (Semenikhina et al., 2020).

An important element that increases the effectiveness of using information technologies is the convenience and simplicity of the "personal computer–user" interface. This allows non-professionals to easily master the use of basic software, develop application packages. The development of the use of information technologies has led to the development of information systems that solve management problems, and the introduction of information support into the educational process (Maslak & Vasylenko, 2018).

Digital technologies are widely used both at work and in the educational process. Now every modern person is a “digital person”, for whom digital technologies in everyday life and professional activities are an integral part. Digital technologies have existed for decades and continue to develop intensively. (Gitahy et al., 2016).

Currently, innovative digital technologies are being developed and implemented in the educational process, these are artificial intelligence, augmented and virtual reality, robotics, “smart systems”, the Internet of Things, etc. When digital technologies are combined with professional activities, educational activities, humanitarian, social, and other technologies, there is an opportunity, including “digital” education, to implement a “new reality” (Varzhanskyi, 2020).

Therefore, the teaching process and the process of acquiring knowledge must be ready to respond to the latest challenges of the time, and not only meet modern requirements for the quality of education. At the beginning of the 21st century, the digitalization of the educational process and its application in consulting are increasing all over the world. At the World Economic Forum in Davos, the most promising digital technologies were identified: artificial intelligence, cloud technologies, blockchain, mobile technologies, biometric technologies, augmented reality, virtualization, and additive technologies (3D printing) (Prieto Taborda et al., 2019).

One of the main advantages of using digital technologies in the process of ensuring high-quality consulting activities in the modern information educational space is that the teacher can not only control the effectiveness of learning in an applied sense, but also the amount of time spent on solving a specific task, the speed of assimilation of material, and the level of perception of new information. Teachers can be freed from a significant mass of paper documents thanks to online technologies. Students can exchange thoughts and ideas, work in a group on any project. The informatization of education will allow for to provision of free access to any educational content on the Internet (Holovnia et al., 2023).

There is a wide variety of test tasks for students, there is more free time for quality preparation for classes, reviewing incomprehensible parts of new material, which is a significant aspect that positively affects the level of success of all educational institutions in terms of distance learning, because the verification of the acquired competencies of students is mainly carried out in the form of test tasks. Test tasks are designed to provide an opportunity to consolidate the material well and gain quality knowledge on each topic and cover all aspects of the theoretical material (Marhulov, 2021).

The need to use computer technology for automation of control, appropriate software causes systematic control of knowledge of a large number of students, and the use of computers for knowledge control ensures increased efficiency of the educational process and is economically beneficial. With their use, the quality of training is enhanced by synthesizing practice and science, and is not lost. For participants in the learning process, the learning process takes place in comfortable conditions, and the participants themselves become translators and carriers of knowledge during educational interaction (Hromovenko & Tytska, 2020).

The main components of the digitalization of educational institutions are:

- Electronic educational resources;
- Online education;
- Training using simulators;

- Electronic document management;
- Formation of competencies necessary in the digital world (Knysh et al., 2024).

The modern education system is experiencing a crisis of creativity. Classes increasingly discourage independent learning of new things by students, pay little attention to establishing an objective connection between the acquired knowledge and the surrounding real world, and to finding non-standard answers – use your imagination to standard questions, instead of using stereotypical models. Therefore, the educational institution of the future should become a place for the development of the human mind, and not just a place for the transfer of knowledge. Its main task is innovation and creativity, and not a mechanical response to tests or repetition of memorized facts. (Romashko, 2021).

Therefore, we believe that in modern conditions, the main vectors of education development are:

- Speed – the usual accumulation of knowledge has lost its relevance, and learning keeps pace with the times;
- Interdisciplinary content – combining knowledge from different spheres of life requires a direction that erases the rigid boundaries between education, business, production, and other spheres;
- The process of obtaining new knowledge simplifies the availability of materials in real time;
- Motivation and enthusiasm – fundamental principles in education, in which teachers, directing students in offline and online modes, become coordinators.

Therefore, within the framework of the trend of digitalization of education, a separate issue is the implementation of distance learning with new capabilities of digital technologies and on new principles (Mushenyk, 2022).

Analysis of the results of experimental work on assessing the effectiveness of the methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training.

The experimental study was conducted by a specially developed program based on the methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training. Based on the developed methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training, factors (dependent and independent variables) were identified that affect the state of consulting competence of future specialists (educational and methodological resources and conditions of professional training) and that change under this influence (motivational, cognitive components).

To prove the hypothesis of the study, we chose a parallel experiment. Therefore, the EG and CG of students were created. EG was influenced by the independent variable methodology. CG of students was not affected by this influence.

The experimental study program included the following actions: outlining the tasks of the experiment according to the specified goal; determination of the time and place of the experiment, its volume; characteristics of the groups and sample involved in the experiment; description of the methodology for experimenting; description of the materials for experimenting; characteristics of the variables influencing the results of the experiment; description of the interpretation and processing of the results of the experimental study.

The pedagogical experiment to verify the effectiveness of the developed methodology for the formation of consulting competence in the modern information educational space of future specialists was carried out in three stages: preparatory, practical, and final.

The preparatory stage of the study is aimed at performing the following tasks: analyzing the professional literature on the research problem; studying the experience of forming consulting competence in the modern information educational space of future specialists.

The practical stage of the study is aimed at implementing the following tasks: specifying the research hypothesis; developing and implementing a program based on the methodology for the formation of consulting competence in the modern information educational space of future specialists; ascertaining the state of consulting competence, and making control diagnostic sections. That is, the practical stage included three stages: ascertaining, formative, and control.

A formative experiment in the process of specially organized professional training of students was directly aimed at studying the phenomenon under study – the effectiveness of the methodology for forming consulting competence in the modern information educational space of future specialists.

The control experiment was conducted to compare the results obtained by students in the experimental group with the results obtained by students in the control group. The dynamics of the formation of consulting competence in the modern information educational space of future specialists in the process of professional training according to all specified criteria and levels were shown.

Before conducting the formative stage of the experiment, all participants and interested parties were familiarized with the ideas of the study. For this purpose, methodological recommendations were developed and implemented, which included: the idea, research hypothesis, definition of the research problem; creative tasks; methodological advice on the features of implementing the complex of tasks for forming consulting competence in the modern information educational space of future specialists; methodological advice on assessing the level of formation of consulting competence of future specialists.

At the final stage of the study, to increase informativeness, a discussion of the experimentally obtained data was conducted, the justification of the choice of methods for processing the obtained experimental results, the results of their processing and analysis, formulation of conclusions.

To verify the effectiveness of the proposed developed methodology for the formation of consulting competence in the modern information educational space of future specialists, selective observations were carried out to reveal the meaning of certain characteristics of the process and draw a conclusion based on the selective population (sample) from the general statistical (general).

Based on the generalization of a series of observations conducted in higher education institutions, the representativeness of the sample in the experimental and control groups of students was ensured.

Respondents who participated in the formative experiment were divided into 2 groups: experimental (EG) and control (CG). EG included 48 students, CG – 42 students. A representative sample was made up of parallel control groups and experimental groups in the study.

To find the most effective methods, means and forms of organizing the educational process, forming consulting competence in the modern information educational space of future specialists, educational monitoring was used, the purpose of which was to clarify the factors necessary for changing the situation, development, and not just tracking the state of a certain subject of educational activity. Educational monitoring was used according to two levels of functioning:

1. **Individual**: self-assessment by students of the quality of their consulting competence in the modern information educational space;
2. **Local**: assessment by a higher education institution of future specialists regarding the quality of their education, their achievement of the appropriate level of formation of consulting competence in the modern information educational space, according to certain indicators.

Methods of probability theory and mathematical statistics were used as the basis for processing the results of the experiment, in particular, the calculation of Student's t-criterion.

We were guided by the basic provisions when choosing diagnostic methods regarding reliability, validity, objectivity, and pedagogical measurements.

The implementation of these tasks is impossible without the development and application of the author's educational and methodological complex for the developed methodology for the formation of consulting competence in the modern information educational space of future specialists, to support the formation of consulting competence in the process of professional training. The content of the author's educational and methodological complex is focused on the features of the formation of consulting competence in the modern information educational space of future specialists; familiarizing students with the current problems of the current state of professional education; issues of organizing the educational process and its effective implementation in educational institutions during professional training; ways and types of using innovative educational technologies in the conditions of professional training of students.

In the conditions of higher education institutions, the subjects of management of the process of formation of consulting competence in the modern information educational space of future specialists are teachers of the cycle of disciplines of practical and professional training.

The ascertaining experiment, conducted through interviews with students, questionnaires, and statistical processing of the results, made it possible to state that at 97% level, the difference between the probability samples of the confidence interval, which were the control and experimental groups, is within 5% and is statistically insignificant, that is, the difference between the estimates of the levels of formation indicates an almost identical general level of formation of consulting competence in the modern information educational space of future specialists of the control and experimental groups (28% of respondents of the EG and 30% of respondents of the CG showed a low level of consulting competence, which made it possible to determine methods for increasing consulting competence in the modern information educational space of future specialists and to develop a methodology for the formation of consulting competence.

The results of the ascertaining experiment showed: there is mainly no interest in the formation of consulting competence, there is insufficient awareness of the need for management activities, in the context of the future profession there is no interest in studying the management component – in 30% of respondents in the control groups and 25% of respondents in the experimental groups.

Interest was shown in managerial activities, but only from the outside, because the respondents were dominated by external motives, 50% of future engineer-teachers in the control group and 57% of the experimental group.

A high desire to independently master managerial activities was characterized by 20% of respondents in the control group and 18% of respondents in the experimental group.

The results obtained indicate a low motivation of future specialists to form consulting competence. This explains the predominant focus on their own interests of future specialists. For respondents, education or professional activity is are only means of expressing their own "I". Such a focus has negative consequences: when solving professional problems, a tendency to make unconsidered and hasty statements in discussions; a desire to impose one's opinion on the team; a desire to always stand out, painful perception of criticism or remarks; adherence to a rigid algorithm of managerial actions, ignoring the needs of others; inability to cooperate or compromise in conflict situations, the predominance of motives for one's own well-being; a tendency to irritability, aggressiveness, and rivalry.

The formative experiment in the implementation of the methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional

training contributed to a qualitative change in the indicators of the phenomenon under study in the experimental groups.

Thus, compared with the data of the initial diagnostic section, the dynamics of motivation of respondents in the experimental groups are progressing in a positive direction.

In the experimental groups, the number of students who are aware of the need to form consulting competence and are distinguished by a stable interest in management activities increased by 17%. The respondents' orientation is oriented towards:

- Activity and its results, which affect the formation of consulting competence in the modern information educational space of future specialists;
- Interaction and communication.

Qualitative changes in the formation of consulting competence in the modern information educational space of future specialists have positive consequences in the process of professional training about professional activity: enthusiasm for mastering technologies and new skills; orientation to collective activity; ability to recognize and defend promising ideas in the interests of the cause and innovative proposals of employees, etc.

The number of students in experimental groups decreased by 12%, who do not show interest in the formation of consulting competence in the modern information educational space. Positive changes in the attitude of students to management activities indicate a positive dynamic of the formation of consulting competence in the modern information educational space in the process of professional training according to the motivational criterion.

The formation of consulting competence in the modern information educational space depends on the quality of theoretical knowledge, volume, and level of the managerial component of future professional activity.

The corresponding skills, abilities, and knowledge were characterized by the cognitive criterion of the formation of consulting competence in the modern information educational space in the process of professional and pedagogical activity.

During the ascertaining experiment, during the diagnostic section, 77% of the respondents of the control groups and 84% of the respondents of the experimental groups (most of the students) were at low and medium levels. Only 23% of the respondents of the control groups and 16% of the respondents of the experimental groups, according to the specified criterion, showed a high level of formation of consulting competence in the modern information educational space (Fig. 1).

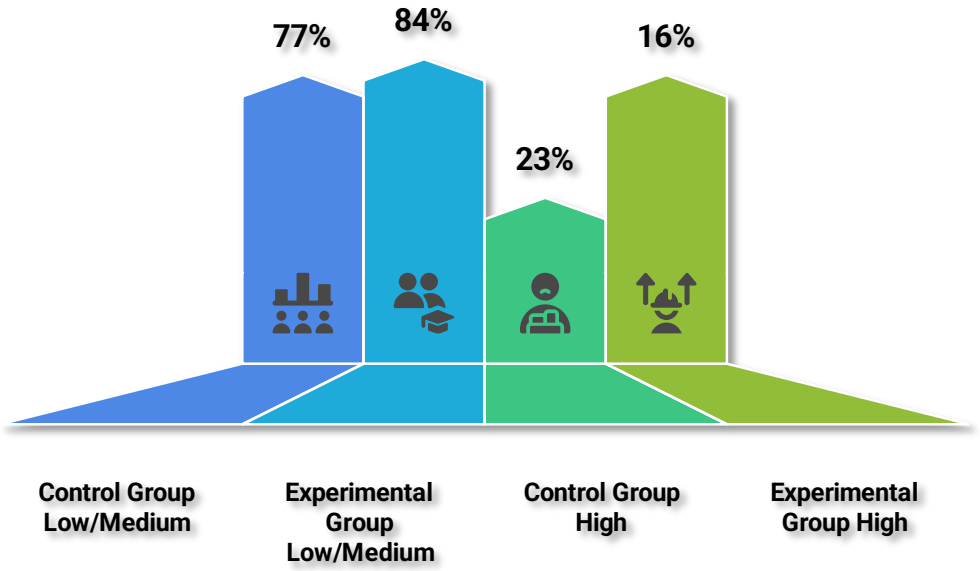

Fig. 1. Consulting Competence Levels in Educational Space.

Positive dynamics were observed after conducting a formative experiment in the experimental groups: the number of respondents who demonstrate a high level of assimilation, possession, and operation of consulting terminology, knowledge of the content and essence of future management activities in professional activities (management of education, training, development), as well as the innovativeness of methods, forms, and styles of management; the presence of a system of knowledge in management, knowledge about managing a professional process, and a team, has decreased by 15% (significantly increased). The number of students whose level of formation of consulting competence in the modern information educational space according to this criterion is characterized as low (by 7%) and average (by 9%). Positive changes also occurred in the control groups, but they are insignificant and did not affect the overall picture of the level of formation of consulting competence in the modern information educational space according to the cognitive criterion.

The rational choice of the sample size of respondents, the quality of which determines the correctness of the obtained data, ensured the reliability of the results of the experimental study.

Regarding the use of Student's t-test for analyzing ordinal data. While the consulting competence levels (low, medium, high) are ordinal, we treated them as quasi-interval based on the underlying scale construction and previous research in similar educational contexts. This approach is supported in educational psychology and pedagogical studies, where ordinal scales with sufficient gradation are often analyzed using parametric methods when assumptions of approximate normality and equal intervals are reasonably met.

The reliability of the differences and coincidences of the experimental and control groups was determined by calculating the t-criterion. Two hypotheses were formulated:

Hypothesis H0: the differences in the level of formation in the process of professional training of consulting competence in the modern information educational space of respondents in the control and experimental groups are not significant enough.

Hypothesis H1: the differences in the level of formation of the level of formation in the process of professional training of consulting competence in the modern information educational space of respondents in the control and experimental groups of students are quite significant.

Let us show the calculation of the dispersion of the level of formation of consulting competence in the modern information educational space of respondents.

The tabular value of the Student t-test − (t_{tab}.(1.96) t_{calc}.(0.18)) − is greater than the calculated one. This indicates that the null hypothesis is not rejected, both samples belong to the same general population, that is, they are homogeneous for the level of reliability 0.05 (probability 5%), which allows us to speak about the insufficient significance of the difference in the level of preparedness of the control group and the experimental group of respondents and are conditionally equal.

The motivation of students in the experimental group after the experiment shifted towards an internal position, when the activity itself is important for the student. Thus, in the process of professional training, a high level of motivation formation to the level of formation of consulting competence of respondents in the EG increased in the modern information educational space by 17% compared to the CG, where the level increased by only 4%. Thus, the most significant qualitative changes at a high level of formation of the motivational component were confirmed by the analysis of experimental data.

The low level of formation of the motivational component also demonstrated positive qualitative changes: we observed a decrease in the number of students in the control group by 5% and in the experimental group by 12%.

At the average level, the smallest dynamics of qualitative changes in the level of formation of the motivational component were recorded: in the CG, 0%; in the EG, 5%.

In the control and experimental groups, a comparative analysis of the level of formation of the motivational component, in particular, the values of the average absolute value of qualitative changes, allowed us to conclude that the positive dynamics of qualitative changes is due in the CG to traditional professional training (Avg = 4%), and in the EG – the result of professional training of students using the experimental method of forming consulting competence in the modern information educational space of future specialists in the process of professional training is significantly higher (Avg = 14%).

Let us consider the results of the formation of the cognitive component.

Significant shifts were recorded in the experimental group by the end of the experiment. An increase in the high level of formation of the cognitive component is observed in EG students by 15%. In the CG, shifts in the opposite direction at this level occurred. The number of students with a high level of formation of the cognitive component decreased by 2%, which we explain by the decline in the motivational component of consulting competence, which is dependent on external factors of students' professional training. 7% of respondents (a significant number of students) EG – moved to the average level from low.

It should be noted that the analysis of experimental data showed qualitative changes, which are most significant, at a high level of formation of the cognitive component. During the pedagogical experiment, we observed an increase in the number of students by 15% in the EG. In the CG, the smallest dynamics of qualitative changes in the level of formation of the cognitive component were recorded in the category "low level" – 0.8%.

Comparative analysis of the level of formation of the cognitive component in the control and experimental groups, in particular, the values of the absolute average value of qualitative changes allowed us to state that in the CG the positive dynamics (Av) = 2%) of qualitative changes is due to traditional professional training, and in the EG – the result (Av = 10%) of professional training of students using the experimental method of forming consulting competence in the modern information educational space.

The obtained experimental data on positive changes in the formation of consulting competence, its components in future specialists, give grounds to speak about the effectiveness of the experimental method in the process of professional training.

Analysis of experimental data at a low level showed qualitative changes in the formation of consulting competence of future specialists, which are due to the decrease in the number of students in the CG by 3% and in the EG by 9% during the pedagogical experiment for this category. Positive qualitative changes were demonstrated by a high level of formation of consulting competence: in the CG, there was an increase in the number of students by 2% and in the EG by 14% (Fig. 2).

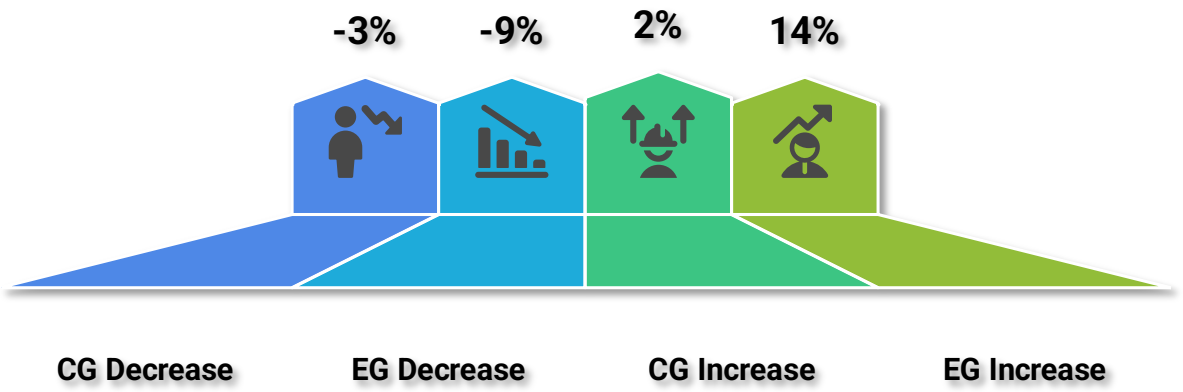

Fig. 2. Changes in Student Numbers During Experiment.

Comparative analysis in the experimental and control groups of the values of the average absolute value of qualitative changes in the level of formation of consulting competence made it possible to say that the positive dynamics of qualitative changes in the CG is due to traditional professional training – Avg = 2%, and in the EG – Avg = 10%) – the result of professional training of students using the experimental method of forming consulting competence in the modern information educational space of future specialists in the process of professional training.

Assumptions for the use of Student's t-test.

The use of Student's t-test in this study is based on the following statistical assumptions:

1. Normality of distribution:

The data in each group (experimental and control) have an approximately normal distribution. To test this assumption, the Shapiro–Wilk test was used, which is appropriate for small samples. Visual analysis was also performed using graphs that confirmed the approximate normality of the distribution.

2. Homogeneity of distribution:

The variances in the control and experimental groups are approximately the same. This assumption was tested using Levene's test for equality of variances. The results obtained showed that the assumption of homogeneity is not violated.

Both assumptions were tested before using the t-test. Since the conditions of normality and homogeneity were met, the use of parametric analysis (Student's t-test) is methodologically justified for comparing mean values between the control and experimental groups.

Empirical substantiation of the main hypothesis.

The main hypothesis of the study was that the use of the developed methodology contributes to a statistically significant increase in the level of formation of consulting competence in students of the experimental group compared to the control group.

To test the hypothesis, mathematical statistical methods were used. In particular, the Student's t-test for independent samples was used, which allowed comparing the average values of competence indicators between the experimental (EG) and control (CG) groups after the formative stage of the experiment.

The results of the statistical analysis showed:

The average value of the consulting competence index in the EG was M = 3.87, SD = 0.62, and in the CG, M = 3.21, SD = 0.59;
The calculated value of the t-test: $t(88) = 4.91$, $p < 0.001$;
The effect of the implemented methodology was calculated using Cohen's d effect measure, which was $d = 0.95$, which indicates a large practical effect according to generally accepted criteria.

In addition, the assumptions regarding the use of parametric tests were checked:

The normality of the distribution was confirmed by the results of the Shapiro–Wilk test ($p > 0.05$);
The homogeneity of variances was confirmed by the Levene test ($p > 0.05$).

Thus, the statistical analysis confirmed that the developed methodology has a statistically significant and practically important impact on the formation of students' consulting competence in the modern information educational environment.

Conclusions

Consulting activity is not only a functional management system, but is an independent branch of science and activity aimed at forming and ensuring the achievement of goals by any organizational structure through the rational use of material, labor, financial, and other resources. Consulting activity is a relatively new concept and is an independent branch of science and professional activity aimed at forming and ensuring the conditions for the development of a higher education institution.

Despite the significant achievements of various scientists, there is an objective need to improve the theoretical foundations of consulting in the field of informatization at the present stage, to substantiate strategic priorities, tactical mechanisms, and means of developing consulting services, and to reform the institutional environment of consulting support in the information space.

We have proven the effectiveness of the developed methodology for forming consulting competence in the modern information educational space of future specialists in the process of professional training.

The ascertaining experiment, conducted through interviews with students, questionnaires, and statistical processing of the results, made it possible to state that at the 97% level, the difference between the probability samples of the confidence interval, which were the control and experimental groups, is within 5% and is statistically insignificant, that is, the difference between the estimates of the levels of formation indicates an almost identical general level of formation of consulting competence in the modern information educational space of future specialists of the control and experimental groups (28% of respondents in the EG and 30% of respondents in the CG showed a low level of consulting competence, which made it possible to determine methods for increasing consulting competence in the modern information educational space of future specialists and to develop a methodology for the formation of consulting competence.

The formative experiment, when implementing the methodology for the formation of consulting competence in the modern information educational space of future specialists in the process of professional training,

contributed to a qualitative change in the indicators of the phenomenon under study in the experimental groups.

The experimental data obtained on positive shifts in the formation of consulting competence, its components in future specialists, give reason to speak about the effectiveness of the experimental methodology in the process of professional training.

Using the methods of mathematical statistics, the confirmed generalization of the results of the pedagogical experiment, in particular its formative stage, the calculation of Student's t-criterion, showed, in qualitative and quantitative indicators, significant differences in the levels of formation of consulting competence of future specialists in the process of professional training.

Research limitations.

The implementation of the pedagogical experiment was carried out in three stages during 2022-2024: preparatory, main, and final.

At the preparatory stage (2022), the goal and objectives of the study were determined, the experimental plan was developed, methods for measuring and processing the results were determined, the control and experimental groups were selected, and their homogeneity was checked.

At the main stage (2023), the experiment was conducted.

At the final stage (2024), the results of the experiment were analyzed, their reliability was confirmed, and conclusions were drawn about the pedagogical effect of the experiment.

Research relies heavily on the accuracy and reliability of data. The following digital data collection tools were useful in the study: MS Excel and SPSS (Statistical Package for Social Science) programs.

The total sample size in the article is 90 respondents. The sample of respondents was formed by random selection using the technical procedure for calculating the selection step.

During the experimental study, diagnostic data on the levels of social competence of higher education applicants were determined through informational influence and were divided into a control group (42 students) and an experimental group (48 students).

The limitations of this study allowed for the following impact on the results: improved quality characteristics of the material, optimally specified goals and objectives, and increased effectiveness of the results.

Future research directions.

Despite a significant amount of theoretical and applied research, a number of important scientific tasks remain unresolved. In particular, the typology of types of consulting project diagnostics needs to be developed, as well as the systematization of their influence factors.

The methodology for managing the diagnostics of consulting project implementation results and the model for economic evaluation of the implementation of diagnosed consulting projects require thorough improvement.

It is important to develop a graphical and analytical model for diagnosing the results of consulting projects for enterprises, which allows taking into account the interests of project participants in choosing diagnostic methods and techniques, as well as organizing monitoring of indicators and automated processing of diagnostic results to regulate deviations from the optimal values of the results of the diagnosed project.

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