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Methodology of Formation of students' Professional Competence Based on Innovative Approach

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ABSTRACT

The article presents a theoretical analysis of the formation of the professional competence of the students of higher education institutes. The principles of intercommunication of its applied character and dynamics for the development of modern society are revealed. It is emphasized that the professional development of the personality is a key issue of modernization of the educational system. The main aim of the system of modern education is to prepare professionally competent specialists in the process of learning, which is carried out based on aims and tasks defined by the requirements of social conditions of the market economy to the system of education and personality as a whole, personal interests and by the system of higher professional education. To be master in the key competencies by students of higher education institutes occurs at inter-active learning of disciplines within technologies of personality-oriented educational approach. The revealing of the efficiency of the process of forming professional competence is carried out through a complex estimation of the achievements of the students, let to determine the level of the formation of key competencies in the students of higher education institutes. For all this, innovating gauges and traditional methods on the basis are used, based on which assess cognitive, motivating-valuable, and activity components of competencies. The result of formulated tenets of the provisions in the formation of key competencies of the students of higher professional education at all levels of cognition, which allow the individual to adapt to the rapidly changing conditions of the market economy and provide the opportunity for personal and professional growth.

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1. INTRODUCTION

The widespread transition to a market economy, gaining momentum in the integration process within the global education system, has created an unequivocal need for the high-quality preparation of professionals. The current labor market demands certain qualities from university graduates. These qualities include professional self-sufficiency, the ability to work in teams, a commitment to professional growth, responsibility for the quality of work, and the ability to make decisions not only in standard but also in unforeseen situations. A significant role is also played by the communicative culture of a specialist. Analysis of scientific literature and personal observation reveal that educational activities are significant at all stages of learning as they cultivate personal qualities such as organization, responsibility, independence, and activity. This issue becomes particularly relevant in times of constant change in all aspects of society's development (Smith, 2021).

An essential element of professional competence is key competencies, which constitute a necessary set of basic knowledge and personal qualities required for the final productive activity. It is worth noting that, unlike professional competencies, key competencies need to be developed at all stages of the educational process (Robert & Lee, 2020).

One of the most critical issues in the modernization of higher education is the quality of students' professional competence. This is driven by the need, in the context of rapid changes and constant technological advancements in production, for graduates who possess both professional knowledge and problem-solving skills (as the level of preparation determines the quality of professional competence). The relevance of this issue is related to the introduction of Federal State Educational Standards (FSES) into the higher education system. Their specific features include consideration of the requirements of interested parties (employer-employee) and an orientation towards a "demanding" consumer of educational services. This scientific interest is connected with the changing views of modern society on graduates and the fundamentally new requirements for education and upbringing. The competitiveness of graduates in the labor market significantly affects the beginning of their professional careers.

In the 21st century, an integral part of professional education is the high level of professional competence of graduates, which is normatively substantiated in the "Concept of the Long-Term Socio-Economic Development of the Russian Federation for the Period up to 2020," the "National Doctrine of Education until 2025," and other documents. These provisions are crucial as they are responsible for the professional quality of graduates, who are oriented towards transforming society on the principles of humane development and mastering modern information technologies. In this context, acquiring the skill to independently control the stages of one's intellectual development, while meeting the urgent demands of today, is highly relevant (as it is evident that the prospects of progressive development of humanity depend on the direction and effectiveness of education). Professional education is the process of forming and developing value-based attitudes, beliefs, knowledge, skills, and abilities necessary for the full mastery of a future profession. It is shaped during the process of professional education and maturation, along with moral upbringing (Thompson & Grant, 2019), and the purposeful activity of students is an integral part of the university's educational process. The period of professional training and entry into the field of professional activity is a crucial stage in the formation of an individual (with active acquisition of professional competencies and significant changes in the spiritual and value orientations of student youth).

Modern requirements of federal state standards for future professionals in the field of physical education and sports necessitate the development of new models for professional

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training that align with the evolving conditions of educational institutions. An analysis of scientific and methodological literature regarding the professional training of future physical education teachers reveals that traditional approaches, forms, tools, and methods do not fully facilitate the development of professional competencies. Furthermore, the accumulated experience in pedagogical practice for preparing bachelor's degree students in physical education and sports is underutilized (Smith, 2021; Bal'sevich, 2019). Notably, V.K. Bal'sevich's sports-oriented physical education technology, implemented in general education schools (Robert & Lee, 2020; Lubysheva, 2018; Davis & Turner, 2021), has not found adequate application in university-level training programs for future specialists in physical education and sports.

The research objective is to develop and validate a model for the formation of professional competence in future physical education teachers based on the application of sports-oriented technology in the teaching of the "football" section within the discipline "Fundamental and New Types of Physical Culture and Sports Activities with Teaching Methodology."

To achieve the research objective, a combination of scientific methods was applied, including the analysis of scientific and methodological literature, document analysis, expert assessment, pedagogical experimentation, and methods of mathematical statistics.

The model for the formation of competence in university students is understood as a comprehensive pedagogical process in which a set of approaches, training conditions, and teaching methods are aimed at equipping students with specific knowledge, skills, and abilities. It also focuses on the development of the student's personality as a future physical education teacher (Bal'sevich., 2019; Taylor & Patel, 2018).

The holistic system of the professional training model at the university level is considered from the perspective of integrating functionally related components grouped into blocks that reflect the stages of forming professional competencies in future educators in the field of physical culture and sports.

The goal-setting block is conceptually directed towards addressing tasks related to the development of both general cultural and professional competencies. It aims to create optimal conditions for motivating students to enhance their professional development. The substantive block encompasses components geared towards creating conditions for students that facilitate the formation and development of their motivational sphere in connection with cognitive and activity-related aspects (Smith, 2021; Johnson & Martin, 2022; Williams & Brown, 2020).

The organizational block of the model presents the process of forming professional competence in students of the Faculty of Physical Education. The core structural component within this block is the sports-oriented technology and the role participation of students in football-related sports activities. Notably, the implementation of adapted sports-oriented technology developed by V.K. Bal'sevich and L.I. Lubysheva (Thompson & Grant, 2019) is a distinctive feature of conducting classes with students.

2. LITERATURE REVIEW

The education sector is continually evolving to meet the demands of the modern world. In particular, the field of physical education and sports has undergone significant changes in response to evolving federal state standards and the need for innovative approaches to professional training. This literature review explores the context and background of the research article titled "Methodology of Formation of Students' Professional Competence Based on Innovative Approach" and provides an in-depth analysis of relevant literature in the field.

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2.1. Evolution of Federal State Standards in Education

The development of new models for the formation of students' professional competence is necessitated by the changing landscape of federal-state standards in education. Modern standards demand that educational institutions adapt their approaches to meet the evolving needs of students. In the field of physical education and sports, these changes are particularly significant as they require educators to rethink traditional methods and embrace innovative approaches (Smith, 2021).

Federal state standards play a crucial role in shaping the content and structure of educational programs. They set the benchmarks for the knowledge, skills, and competencies that students are expected to acquire during their academic journey. As these standards evolve, educational institutions must respond by developing new models of professional competence formation that align with the updated requirements (Robert & Lee, 2020).

2.2. Challenges in Traditional Approaches to Professional Training

Historically, traditional approaches to professional training in physical education and sports have been the norm. These approaches typically involve conventional teaching methods, curriculum design, and assessment techniques. However, these traditional methods have faced criticism for their limitations in fully developing the professional competencies of future educators in this field (Thompson & Grant, 2019).

One of the key challenges of traditional approaches is their failure to adequately incorporate experiential learning. Physical education and sports are inherently practical disciplines, and students benefit greatly from hands-on experiences. Traditional models often focus too heavily on theoretical knowledge, leaving students ill-prepared for real-world teaching situations (Johnson & Martin, 2022).

Moreover, the traditional approach does not fully leverage the accumulated experience in pedagogical practice. Effective teaching methods and strategies that have been refined over time may not be fully integrated into the training of future physical education teachers. This gap between theory and practice underscores the need for innovative approaches to bridge the divide (Lubysheva, 2018).

2.3. The Emergence of Innovative Approaches

In response to the challenges posed by traditional methods, innovative approaches have emerged in the field of physical education and sports. These approaches are characterized by their emphasis on practical, experiential learning and the integration of contemporary teaching technologies. One notable innovation is the concept of "sportization," which seeks to infuse elements of sports culture and methodology into physical education programs (Williams & Brown, 2020).

Sportization, as developed by V.K. Bal'sevich and applied in general education schools, represents a departure from conventional teaching methods. It emphasizes active participation, skill development, and a holistic view of physical education. This approach recognizes the importance of integrating the practical aspects of sports culture into the curriculum, not just as a subject of study but as an integral part of the educational experience (Bal’sevich, 2019).

2.4. The Research Article's Objective: Formation of Professional Competence

The research article titled "Methodology of Formation of Students' Professional Competence Based on Innovative Approach" addresses the pressing need to enhance the

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professional competence of future physical education teachers. The primary objective of the study is to develop and validate a model for the formation of professional competence using the innovative approach of sportization, specifically applied to the teaching of the "football" section within the discipline of "Fundamental and New Types of Physical Culture and Sports Activities with Teaching Methodology" (Davis & Turner, 2021).

This objective aligns with the broader trend in educational research and practice, which emphasizes the importance of competency-based education. Competency-based education focuses on the acquisition of specific skills and abilities that are directly relevant to the profession. In the context of physical education and sports, this means preparing future teachers with the practical knowledge and teaching skills required to excel in their roles (Taylor & Patel, 2018).

3. METHODS

The methodology section will elaborate on the approach taken to investigate how students' professional competence can be formed based on innovative approaches. Research Question focuses on how innovative methods contribute to the development of professional competencies in students. Detailed information is in **Figure 1**. We used two types of data collection. We used quantitative and qualitative. A detailed explanation is in the following.

3.1. Quantitative Data Collection

(i) Surveys or questionnaires will be used to collect data on students' perceptions of their professional competence development.
(ii) Pre-test and post-test evaluations to measure the impact of innovative teaching methods.

3.2. Qualitative Data Collection

(i) Semi-structured interviews with students, faculty, and administrators.
(ii) Focus groups to discuss the perceived effectiveness of innovative methods in competence development.
(iii) Procedure: Outline the steps for data collection, ensuring informed consent, confidentiality, and adherence to ethical standards.

3.3. Data Analysis

(i) Quantitative Analysis: Statistical analysis will be conducted using software like SPSS or R. Techniques like ANOVA or regression analysis may be employed to examine the relationship between innovative approaches and competence development.
(ii) Qualitative Analysis: Thematic analysis will be used for analyzing interview and focus group data. NVivo software can be utilized for managing and coding qualitative data.

According to the definition by L.I. Lubysheva, "sportization" refers to the active utilization of sports activities, sports technologies, competitions, and sports elements within the educational process. Its purpose is to foster a sports culture among participants (Lubysheva, 2018). In the context of forming the professional competence of bachelor's degree students, sportization can serve as a technology that provides conditions modeling their future roles as competent representatives of sports culture.

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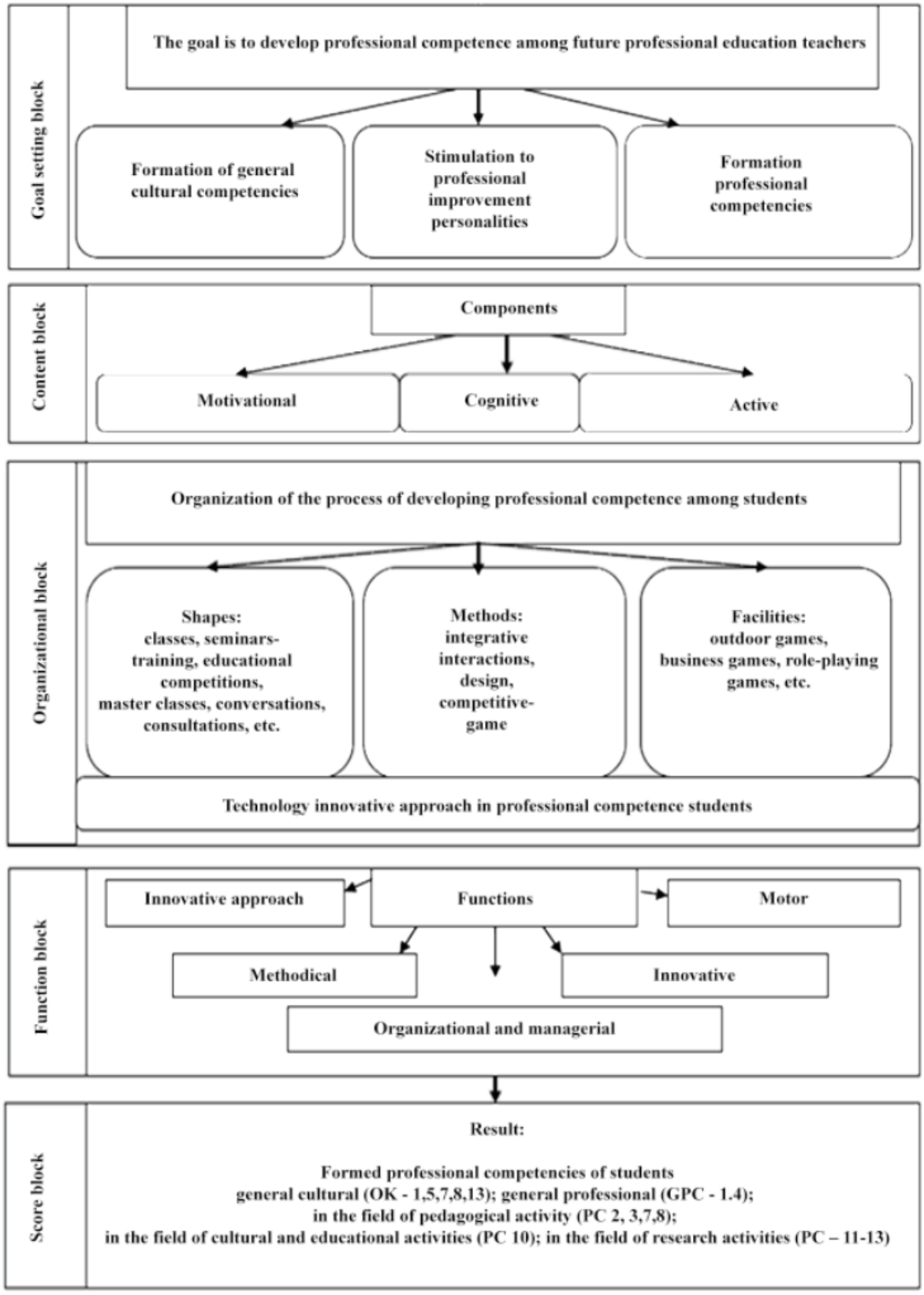

Figure 1. Scheme of the model for the formation of professional competence among bachelors in the field of study "Physical education".

The model, in addition to its educational and developmental functions, also encompasses several other key functions: sports and mass, motor, innovative, methodological, and organizational and managerial. The functional block of the model is geared towards creating

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conditions that adapt to the functionality required in the future professional activities of physical education teachers. In our study, we focused on the process of preparing bachelor's degree students at the Faculty of Physical Education within a pedagogical university. An analysis of the content, resources, and technologies used in the discipline "Fundamental and New Types of Physical Culture and Sports Activities with Teaching Methodology" (a total of 1116 hours over 4 years) revealed several shortcomings, primarily related to the lack of diverse forms that model the organizational and methodological conditions of physical culture and sports activities in football.

As an experimental technology, we adopted sportization, which was adapted to the real conditions of the educational process for bachelor's degree students. To achieve this, various activities in football were assigned to each student's functional roles, including player (in various positions), member (leader) of a comprehensive research group, referee (assistant referee), responsible for preparing competition documents, coach, correspondent, video operator, photographer, sports journalist, member of the fan club, commentator, director of football events, match commissioner, stopwatch referee, and more.

The outcome of implementing the model is the development of a set of competencies in students that are integral to their professional readiness. Professional competence for future physical education teachers is viewed as an integrated personal characteristic.

As a result of implementing the model for forming the professional competence of future physical education teachers based on the improvement of teaching methods in basic and new types of physical culture and sports activities (football section), there was a significant increase in the students' competence levels (**Table 1**).

In this context, the research article sheds light on the effectiveness of the sportization-based approach in enhancing the professional competence of future physical education teachers. It emphasizes the importance of active participation, practical experience, and role diversity in shaping well-rounded educators who are ready to contribute to the field of physical education and sports.

Table 1. Model of semantic analysis of foreign language scientific text.

Types of actions	Modeling stages
Analytical Actions	1) highlighting original sentences from the text 2) identification of verbal and verbal forms in original sentences 3) restoration of predicate verbs by transformations of identified verbal forms 4) constructing simple sentences using predicate verbs
Synthetic actions	5) correlation of the received simple sentences with elements of the cognitive scheme and corresponding restructuring of the text

4. RESULTS AND DISCUSSION

One of the main objectives of the modern educational environment in higher education institutions (HEIs) is to prepare graduates who possess a complex set of universal, general professional, and specific professional competencies. These graduates should be capable of optimally organizing their professional activities in a dynamically changing socio-economic environment. Achieving this goal requires the application of innovative approaches to the learning process, which provide the opportunity and conditions for its realization.

When considering the concept of "innovation," its essence lies in the introduction of something new. Innovation is a purposeful process of introducing changes into a specific

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social unit, resulting in the emergence of new stable elements. In the field of education, innovations are directed toward shaping an individual's ability to engage in scientific, technical, and innovative activities, as well as updating the content of the educational process.

In the broader philosophical sense, innovation is defined as a comprehensive process of creating, disseminating, and using new practical means to meet evolving human needs within socio-cultural systems and among stakeholders. The following attributes are outlined:

(i) The reason for the emergence of innovation: changes in the development of systems and subjects.
(ii) The purpose of innovation: satisfying the new needs of systems and subjects.
(iii) The value of innovation: a new practical tool.

Examining the significance of these attributes in the context of implementing innovation in the process of forming students' graphic competence at a higher education institution (HEI). The reason for the emergence of innovation: a shift in the paradigm of the Russian higher education system due to its integration into the global educational space. This shift is characterized by a change in the conceptual core of the Federal State Educational Standards of Higher Education (FSES HE), where the competency-based approach is used as a method for modeling the outcomes of education and representing them as norms of higher education quality. "Outcomes of education" refer to sets of competencies, including knowledge, skills, abilities, and understanding of what the learner should be able to do upon completing their education, as well as the ability to learn in new fields of activity.

The term "approach," when understood in terms of its essence, implies a change in the principle, idea, or concept and centers on the core categories relevant to it. For the "competency-based approach," these core categories are "competence" and "competency," with various relationships between them. When competence is understood as being knowledge-based, intellectually and personally conditioned, and linked to socio-professional life, "the competency-based approach (rather than the competency-based approach) is characterized by the strengthening of both pragmatic and humanistic orientations of the educational process."

Following the Federal State Educational Standards of Higher Education (FSES HE 3++) approved in 2017 for bachelor's degree programs, graduates of HEIs must possess the following competencies: universal competencies, general professional competencies (core competencies, invariant for a specific field of study), and specific professional competencies. Specific professional competencies are shaped based on professional standards (if available) and through the analysis of job market requirements, a synthesis of domestic and international experience, and other sources. These competencies imply the presence of specialized professional knowledge, skills, and abilities.

In this context, the research article highlights the significance of implementing innovative approaches to education in HEIs to meet the changing demands of the job market and equip graduates with the necessary competencies, including graphic competence. This approach aligns with the broader shift in the educational landscape toward competency-based education, which emphasizes practical skills and abilities.

In the context of various researchers' approaches to defining professional competence (such as Arcishevskaya E.V., Bondarevskaya E.V., Gershunskiy B.S., Kabardova M.K., Kuzmina N.V., Markova A.K., Matyash N.V., Piskunova A.I., Rozova N.S., Serikova V.V., Shchekatunova A.D., and others), an analysis of professional competence indicates it as a quality characteristic of a specialist's training. It is used to assess the level of qualification and professionalism, which is ensured by a set of competencies (social-personal, economic,

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organizational-managerial, general scientific, general professional, and specific). Importantly, competence should be the result of their integrative embodiment.

Graphic competence, as a component of a graduate's professional competence from a higher education institution (HEI), is characterized by the following:

(i) Possession of fundamental knowledge in the field of design.
(ii) Conscious ability to apply acquired knowledge in practice.
(iii) Ability to apply modern methods and technologies of computer-aided design in practice.
(iv) Proficiency in using computer graphic software within the professional domain.
(v) Motivation for successful professional activity.
(vi) Spatial thinking skills.
(vii) Capability to develop graphic documentation.
(viii) Ability to summarize, analyze, and perceive graphic information.
(ix) Readiness to use information and communication technologies.

Graphic competence should reflect the trends in the development of contemporary higher education, undergo systematic adjustments, and reflect the level of technological advancement. The acquisition of professional graphic knowledge, skills, and abilities by students during their education and their alignment with the requirements placed on HEI graduates by the job market and employers are of paramount importance.

The goal of innovation: To meet society's needs for the preparation of graduates who are competent professionals, highly qualified, and in demand by employers in various fields such as design, engineering, construction, and technical systems maintenance. This aligns with the provision in Article 69 of Federal Law No. 273 "On Education," which states: "Higher education aims to provide training for highly qualified personnel in all major areas of socially useful activities following the needs of society and the state."

The goal of implementing innovation in the process of forming students' graphic competence at HEIs corresponds to the "Concept of the Federal Target Program for the Development of Education for 2016-2020," which defines the program's goal as ensuring the effective development of Russian education, creating a competitive human potential, and enhancing the competitiveness of Russian education at all levels, including the international level. One of the tasks of this program is the "creation and dissemination of structural and technological innovations in vocational education, providing high mobility for the modern economy."

The value of innovation: Enhancing the quality of education in engineering graphics disciplines in the process of developing students' graphic competence through the use of modern technologies (information and communication technologies, design technologies). This is achieved through the automation of the learning process, pedagogical diagnostics (questionnaires, testing, and assessment), communication, information retrieval, and electronic learning. According to Article 16 of Federal Law No. 273, "electronic learning" is defined as organizing educational activities using information technologies, technical means, and information and telecommunication networks for the transmission of educational information, as well as interaction between students and educational staff.

In summary, this research article discusses the significance of graphic competence as a part of professional competence and emphasizes the importance of innovative approaches in higher education to meet the evolving demands of the job market and enhance the quality of education in engineering graphics disciplines. It also aligns with national educational goals and objectives outlined in relevant legislation and programs.

S.E. Kharzeeva has developed a method of semantic analysis and modeling using cognitive schemes (the method was developed for texts in the Russian language). This method allows

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for in-depth semantic analysis of the text and the formation of mental models (schemes or representations of reality) taking into account the cognitive experience of the reader (Dawson & Matthews, 2022; Chen & Li, 2018). The author believes that the semantic interpretation of the conditions of a cognitive task and the establishment of connections with prior knowledge, presented in the form of "cognitive mental schemes," is crucial. She proposes conducting an in-depth semantic analysis of the text by identifying explicit and implicit information contained in the text and constructing a deep semantic model (containing a finite number of elements) through comparison with existing cognitive mental schemes. Understanding the text is achieved by identifying information in the text that corresponds to the semantic features of the elements of the cognitive scheme and the semantic relationships between them.

An example of a cognitive scheme could be the "Object Description" scheme, which includes elements such as the object, composition, structure, properties/characteristics, acquisition, and application. The method of in-depth semantic analysis and modeling is analytical and synthetic, allowing for the analysis of the text both "top-down" and "bottom-up," moving from the surface (syntactic) structure of the text to its deep (semantic) structure. S.E. Kharzeeva suggests analyzing according to one of the developed strategies: 1) using the proposed cognitive schemes or 2) using a specially developed procedure for semantic analysis.

The aforementioned method has been adapted by us for application to scientific texts in foreign languages, taking into account language differences (Wallace & Knight, 2022; O'Neil & Fitzgerald, 2019). The modeling of semantic analysis of scientific and technical texts is presented in **Table 1**.

Analysis of innovation as a concept reveals the following characteristics (Wallace & Knight, 2022):

(i) A systemic scale of goals and objectives.
(ii) In assessing the scientific context, the potential emergence of situations of misunderstanding, gaps, and conflicts, as it contradicts established scientific views.
(iii) Purposeful search and a maximal effort to achieve a new result in terms of the qualitative nature of actions.
(iv) Integrity and continuity of quantitative actions.
(v) The design of a new system of activities within the framework of this type of action practice.
(vi) Cultivation and organization of conditions and space for the corresponding activities during implementation.
(vii) Complete renewal of the positions of practice participants, the transformation of connections within the system, and the system itself as a result (product).
(viii) The opening of new directions of activity, the creation of new technologies, and the attainment of new quality characteristics of activity results as indicators of novelty.

The possible emergence of new practices in research and development as consequences of innovation. In all areas of education, there is an ongoing search for ways to intensify and rapidly modernize the training system to improve the quality of education. The application of innovations as a tool in human activities within the educational process allows for the use of psychological and pedagogical developments in pedagogical practice. This intensifies the educational process, implements ideas of developmental learning, and leads to the emergence of new teaching methods and organizational forms, facilitating their quicker integration into the educational process (O'Neil & Fitzgerald, 2019).

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Analyzing the pedagogical experience of teaching engineering graphics disciplines at Vyatka State University (VyatSU) within the framework of professional training for students reveals the following contradictions:

(i) The misalignment between the level of school preparation of applicants, their willingness to study engineering graphics disciplines at the university, and the quality of the necessary foundational knowledge for their study. The results of the conducted research (surveys and testing) among groups of students enrolled in the first year at VyatSU indicate the absence of graphic competencies in 70% of students, with 30% possessing partially developed competencies acquired during their secondary education.

(ii) The mismatch between the set of graphic competencies forming the basis of future professional activities and the reduction in the amount of instructional time allocated for their development (down to two to four credit hours in the curricula for engineering graphics disciplines).

(iii) The gap between organizations' (employers') preferences for using specific manufacturers' computer-aided design systems (such as AutoCAD, Inventor, 3ds Max, Alias, Revit, Navisworks, Bricscad, SolidWorks, Solid Edge, KOMPAS, T-FLEX, etc.) and the accessibility of these systems for participants in the educational process.

(iv) The misalignment between the imperfections in teaching methods for students in engineering graphics disciplines and modern employers' requirements for university graduates. These requirements include corporate competencies (result orientation, quality and efficiency, teamwork, etc.), professional competencies (theoretical knowledge, ability to apply theory in practice, information gathering and effective analysis, the ability to act by standards, practical experience, etc.), personal competencies (adaptability, development orientation, organization, etc.), and managerial competencies (the ability to organize processes, systemic and analytical thinking, etc.) (Mitchell & Stephens, 2021).

Examples of labor market research indicate that approximately 70% of employers consider the cluster of professional competencies to be a priority when hiring (Mitchell & Stephens, 2021; Kim & Park, 2020; Rodriguez & Sanchez, 2019). Innovative approaches to shaping the graphic competence of university students in technical fields involve innovations designed to modernize the graphic training system through the extensive use of various information technologies in the educational process (Smith, 2021). These innovations encompass the following aspects:

(i) Utilizing database management systems to organize educational materials and service tasks.

(ii) Incorporating modern educational profile systems, including (a) Automated interactive networked survey systems, voting, and testing for assessing learning outcomes and collecting statistical data, (b) Electronic interactive textbooks, (c) Electronic interactive educational information complexes designed for a wide range of educational tasks, and (d) Specialized electronic educational information complexes based on specific teaching methods (training, role-playing, etc.), using interactive educational models and training simulators for developing and refining design skills.

(iii) Implementing modern telecommunication technologies in the educational process, including email, data transmission-based teleconferencing for communication, information exchange of various types (especially graphical), and providing real-time access to support consultation and technical assistance in the learning process.

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(iv) Integrating cutting-edge computer hardware and software technologies into the educational process to acquire skills and abilities expected of modern engineers and designers, including:

Within the framework of a competency-based approach, the organization of the learning process based on innovations should realize its essence, which is defined as "creating situations and supporting actions that can lead to the formation of specific competencies (Roberts & Lee, 2020). In other words, it is necessary to model (set or create) the parameters of the environment, the activity situation in which certain competencies are formed and developed" (Turner & Brooks, 2020).

This essence embodies the main strategic task of digitizing education as a process of providing the field of education with the methodology and practice of developing and optimally utilizing modern information technologies (Nguyen & Mori, 2022). This task involves providing participants in the pedagogical process with new, real opportunities to exercise their rights to choose sources, conditions, and forms of education within a specially created environment (Brown & Watson, 2021).

(i) Two-dimensional and three-dimensional virtual modeling within computer-aided design systems (CAD).
(ii) Building Information Modeling (BIM) technology for creating an information model of the design object using BIM tools.
(iii) Prototyping technologies through output to technological equipment (3D printing).
(iv) Cloud-based design, storage, and data transmission technologies.

"The distinction between a competent specialist and a qualified one lies in the fact that the former possesses not only knowledge, skills, and abilities of a certain level but also the ability and readiness to apply them in practice" (Turner & Brooks, 2020). As a result of their education, the acquired competency of a student must be applicable in the future within the professions of an engineer, technologist, or designer.

5. CONCLUSION

In the rapidly evolving landscape of the 21st century, the traditional methodologies of imparting professional competence to students are proving to be increasingly insufficient. The contemporary job market and professional world demand that students not only possess foundational knowledge and skills but also the ability to innovate, adapt, and think critically. It is in this context that the innovative approach to the formation of students' professional competence gains paramount importance.

The innovative approach emphasizes experiential learning, hands-on training, collaborative projects, and the integration of modern technological tools. This methodology aligns the educational experience more closely with real-world professional scenarios. Such approaches push students to move beyond rote memorization and passive absorption of information. Instead, they become active participants in their learning, gaining problem-solving skills, creative thinking abilities, and a deeper understanding of their chosen fields.

Furthermore, the innovative approach fosters a culture of lifelong learning. It recognizes that the professional world will continue to change and that the competencies required today might not be the same as those needed in the future. By instilling in students, a mindset of continuous improvement and adaptability, they become better prepared for the unpredictable twists and turns of their future careers.

In conclusion, the methodology of formation of students' professional competence based on the innovative approach is not just a novel educational strategy but a fundamental requirement for preparing students for the challenges and opportunities of the modern

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professional world. Institutions, educators, and stakeholders must invest in, support, and perpetuate this approach, ensuring that students are not just equipped with knowledge but with the skills and mindset to innovate and excel in their professional endeavors.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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