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STRUCTURE AND CONTENT OF EXPERIMENTAL COMPETENCE IN PROFESSIONAL TRAINING OF FUTURE PHYSICS TEACHER

The present article is aimed at the study of problems and prospects in the field of structure and content of experimental competence of physics teacher in the process of professional training in higher education institutions of the country. The purpose of the study, the study of the structure and content of the experimental competence of a physics teacher, to determine the conditions for improving the effectiveness of its formation. The main ideas were to define the conceptual apparatus and content of the term «experimental competence», to identify the main components of experimental competence, to assess the current state of formation of experimental competence of university students and to develop proposals to improve the quality of physics teacher training. As a result, the concept of «experimental competence» is defined. In the structure of the experimental competence of a physics teacher the current key elements are identified, their content is disclosed. The presented results of the expert survey confirmed them and showed the need to intensify the work in higher education institution to create conditions for involving students in experimental activities and in the introduction in practice of innovative experimental

approaches in the educational process. Scientific novelty lies in the proposal of specific structural components of experimental competence, and the development of a methodology based on their integration into the educational process of physics teacher training. The results obtained in the course of the study in the EG indicate the feasibility of developing an algorithm for the introduction of specialized courses for the formation of experimental competence of students in the learning process, increasing their readiness for productive and creative experimental activity in the new conditions that are noted in modern school.

Keywords: experimental competence, structure of experimental competence, higher education, professional training of students, future physics teacher, integration model.

Introduction

Experimental competence in the course of professional training of a modern physics teacher is of great importance. The current secondary school physics curriculum in the Republic of Kazakhstan demands more than just strong subject knowledge from teachers. Today's educators must also be skilled in guiding students through both learning and research processes – which necessarily includes hands-on experimentation. Since experimental activity stimulates cognitive activity of schoolchildren, forms scientific thinking and allows to ensure the assimilation of material on the subject through direct practical experience, which gives an independent acquisition of knowledge or confirmation of already studied.

Despite a significant number of studies that have been previously conducted on various aspects of training students or future teachers of physics, the problems in the field of structure and content of experimental competence of a future physics teacher remain insufficiently studied. There are no clearly formulated requirements to the level of formation of appropriate professional qualities and skills on experimental competence of a future physics teacher, allowing universities to provide better training of a future specialist for the education system.

The relevance of the research topic is due to the growing demand for more qualified physics teachers who necessarily possess a developed level of experimental competence, which allows them to effectively organize in the classroom, during the lesson, laboratory activities on topics and demonstrate individual physical experiments. It refers to how well a future teacher is trained in experimental skills and competence that provides further more in-depth understanding of physics fundamentals by their upcoming students and forms basic and developed ideas about the scientific methodology of physical cognition.

The goal of this study is to analyze the structure and content of a physics teacher's experimental competence during their education and professional

development, and to determine the factors that enhance the effective development of these skills.

Objectives of the study, to achieve the objective:

To define the content of the concept of "experimental competence" in relation to the profession of physics teacher;

To reveal the structure of the elements that make up the experimental competence of a physics teacher;

To investigate the specifics of formation of experimental competence in the university learning activity of students in the direction of «Physics teacher training» and evaluate its level;

To propose measures to improve the training process of future physics teachers on the formation of necessary experimental qualification, taking into account modern conditions.

The methods of research were literary analysis of special literature on the topic of research; survey of students and teachers of physics, expert interviews with specialists of higher education and practicing teachers of physics; testing of students; design method for the development of the algorithm and special courses and pedagogical experiment

The present study puts forward a scientifically substantiated hypothesis about the significant correlation between structural and content characteristics of experimental competence and the effectiveness of professional training of pedagogical staff in the field of physical education. The presented hypothesis is based on a comprehensive analysis of modern educational paradigms and methodological approaches to the formation of professional competencies of teachers of natural science profile.

The research hypothesis is formulated as follows: the process of physics teacher training demonstrates a significant increase in efficiency under the condition of systematic integration of the components of experimental competence in the holistic structure of the educational process with the mandatory inclusion of specialized courses focused on the formation of this competence.

The novelty of the study lies in the identification of specific structural components within the framework of experimental competence for future physics teachers and determining the peculiarities of their formation in the process of professional training. It is characterized by an attempt to systematize the components of experimental competence and present a detailed characteristic of each element. In addition, the algorithm of integration of the specified components into the general system of the educational process has been developed, within the framework of which special courses of experimental competence training have been developed, allowing to objectively increase the readiness of a university graduate to organize experimental-practical work in teaching physics at school.

The theoretical significance consists in broadening contemporary pedagogical physics by introducing new insights into the structure and components of experimental competence in future physics teachers. This competence includes: theoretical and practical knowledge, methodological abilities, information and communication skills, and key personal traits.

The practical significance lies in creating a set of recommendations and actions designed to enhance the training system for bachelor's students preparing to become physics teachers.

Materials and methods

To address or to tackle the first task (To determine the content of the concept of «experimental competence» in relation to the profession of physics teacher, the method of literary, legal and documentary contextual analysis was used.

The main reference materials consisted of academic articles, monographs, and textbooks focused on higher education pedagogy, the psychology of vocational education, teaching principles of natural science subjects, and aspects of experimental practice in physics instruction. The research also relied on official regulatory documents, including the Education Law of the Republic of Kazakhstan, national standards for higher education, the professional standard «Teacher», as well as educational programs and curricula for the "Physics Teacher Training" specialty. Job profiles for physics teachers in both secondary schools and universities, along with syllabi, course outlines, and university-issued methodological recommendations, were also utilized.

In the course of the work, scientific and normative-business materials were studied, with a focus on the experimental component of the educational process. The key aspects of the formation of experimental competencies of teachers studying at the university were highlighted

Clear requirements for developing the experimental competence of future specialists were defined. A modern interpretation of the term "experimental competence" within the physics teaching profession was also established.

In the course of solving the second task (to reveal the structure of the elements that make up the experimental competence) in relation to the profession of a physics teacher studying at the bachelor's level, the method of component theoretical analysis was used. This method involves decomposition of competence into separate components and reflection of its each element, with subsequent generalization

The study drew on works by both Kazakhstani and international scholars focused on the professional competence of physics teachers, as well as methodological materials from core and elective physics courses designed to build the experimental skills of future physics educators.

Another method involved conducting a survey among experts, including university physics instructors, secondary school physics teachers, and education department methodologists.

The purpose of the survey was to identify the most significant elements of the structure of experimental competence of a physics teacher. The materials were the author's questionnaire and the result of the survey. A total of 42 people participated in the survey: university physics teachers – 20 people; school physics teachers – 12 people; methodologists of education department – 10 people. The results were calculated and summarized using the methods of statistical and analytical analysis.

At the decision of the third and fourth task materials of research became: tests for diagnostics of level of experimental competence at students of Pavlodar pedagogical university of a name of Alkey Margulan, The research focused on students enrolled in the educational programs 6B01522 «Physics – Mathematics» (referred to as the experimental group) and 6B01511 «Mathematics – Physics» (referred to as the control group). It also analyzed standard and working programs of current courses and curricula used for training future physics teachers in higher education institutions of the Republic of Kazakhstan. Additional materials included lecture content, lab work, and seminar sessions. The primary research methods included a survey in the form of testing for future teachers and the design method for creating specialized courses; pedagogical experiment t. Quantitative processing of the results was carried out using statistical methods, before and after the special courses. Analytical analysis was used to generalize and draw conclusions. The work was carried out as follows: initial diagnosis of the level of experimental competence of students; development of the algorithm and individual special courses designed to develop the missing skills of students and the conduct of individual classes taken from them; control diagnosis of the level of experimental competence of students after the special courses. Summarizing the results and preparing proposals for improving the training of future physics teachers to improve experimental competence in professional training.

When developing tests, we used the experimental competence of physics teachers, proposed earlier by M.S. Pavlova in her work «Experimental competence of a future physics teacher» [1]. Tests to assess the experimental competence of a future physics teacher consisted of five groups of questions.

Competence in the field of school physics classroom (SPC) equipment: What instruments are among the main visual aids in a school physics classroom? What apparatus is used to demonstrate the law of refraction of light? Are you able to create a new device to demonstrate electromagnetic induction using the equipment available in a typical school classroom? Do you know how to inspect and prepare the equipment before the lesson begins?

Competence in student physics experimentation: What is the difference between frontal laboratory work and individual home experimental work? How long approximately should it take for a student to complete one lab activity? What role does the computer and digital technology play in modern school experimentation? What is the main difference between an experimental task and an ordinary laboratory work?

Competence in Demonstration Experimentation: Why do I need a demonstration experiment in a physics lesson? Why is it important to ensure that the explanation of the content of the demonstration is accessible to students? Can the same demonstration experiment be shown to classes of different ages in the same way? Is it necessary to provide a back-up demonstration set-up in case of unforeseen circumstances?

Competence in guiding students' cognitive activity: How to choose the best type of experiment for a particular lesson? Is student feedback important when setting a homework experiment? Should the teacher give students freedom in choosing the type of experiment? Who is responsible for supervising the implementation of home experiment tasks?

Competence in safety regulations: What is mandatory in every physics room? When should a safety briefing be given? What rules must the teacher observe when working with chemicals? What should be done if a student is injured during an experiment?

The procedure for assessing the level of experimental competence in two groups: experimental group (hereinafter referred to as EG) and control group (hereinafter referred to as CG) of 27 people each, and they had their level of competence assessed in the five areas mentioned above. Each participant answered four questions for each competency. For each correct answer, a certain number of points (1-2 points per question) was awarded, and the total score for each competency was a maximum of 8 points. Criteria for assessing the level of competence: high level: 7–8 points (87 % and more); medium level: 5–6 points (63-86 %); low level: 4 and less points (<63 %). The report on the test results is organized in a table format, showing the distribution of correct answers by specific competences. This layout clearly reflects the training level of future school physics teachers across all examined components of experimental competence (measured by percentage of correct responses). These components include: competence in scientific and cognitive functions (SCF); competence in conducting student experiments; competence in demonstrating experiments to students; competence in guiding students' investigative activities; competence in experimental techniques; and overall competence in managing experimental processes competence in the field of experimentation; competence in the field of experimentation. These results

help identify both the challenges and the potential for improving the experimental competence of future physics teachers.

Results and Discussion

The definition of experimental competence of the future teacher is complex and contradictory. M. Moriera studying the experimental competence of a future physics teacher, defines the experimental competence of a future physics teacher from the perspective of the theory of developmental learning [2]. P. Molina-Moreno adheres to a similar opinion [3]. Foreign authors Al M. Salamat [4], A. Papaioannou [5], E. Surahman [6] define the experimental competence of a future teacher as research competence. A similar approach is noted in the work of O. A. Abdumuminova, who also points out that the formation of research (experimental) competence in future teachers is an important condition for the formation of a modern specialist in the field of pedagogy [7]

B. D. Orazov, for instance, places primary focus on developing and applying innovative methods and technologies in his research on building students' experimental skills during physics instruction in the country's higher education institutions. These approaches aim to help students more effectively acquire the practical abilities needed to carry out physics experiments [8]. H. Ahmed considered in the study of electrodynamics the problems of formation of experimental competence of students depending on the competence of teachers, on the example of secondary school [9]. N. Zh. Zhanatbekova, G. K. Zhusupkalieva points out that in the training of future teachers of physics in the formation of experimental-research skills proceed from the principle of continuity and take into account the relationship between the target, project-planning, activity-motivational-result elements [10; 11].

Based on the analysis of the materials, experimental competence in future physics teachers is defined as an integrated quality of a physics educator. It encompasses a combination of professional knowledge, practical skills, and experience that enables them to effectively plan and carry out laboratory experiments, lead practical lessons, and guide research activities in physics.

In their research, S. Sims and S. Sorge examine how experimental competences develop in future physics teachers during their university education. The authors distinguish and describe basic and special competences characteristic for this category of teachers, offer the author's definition of the structure of experimental competences and explain by what methods and conditions it is possible to promote their formation in a classical university. Among the main ways of competence formation she names reproductive activity, search and research activity and creative approaches to solving educational tasks [12; 13].

The analysis of articles and provisions of the Law on Education [14] in RK and the State Educational Standards of RK of Higher Education [15] It was found that there is no explicit reference to the development of specific "experimental competencies". However, the review of practical documents reveals evidence of localized initiatives in this area.Since the lack of a clear legislative fixation does not prevent universities from introducing additional competencies in their educational process. Many universities of RK themselves develop training programs for future physics teachers, including modern teaching methods, including practical-experimental ones.

The findings identified five core components in the structure of a physics teacher's experimental competence: a solid foundation of theoretical and conceptual knowledge; practical abilities in planning experiments; proficiency in using modern equipment and experimental technologies; capability to guide students in independent research; and the skill to interpret data during lessons and assess the quality of the research performed.

The results of the survey of experts on what elements are the most important for the formation of experimental competence of physics teacher are reflected according to Figure 1.

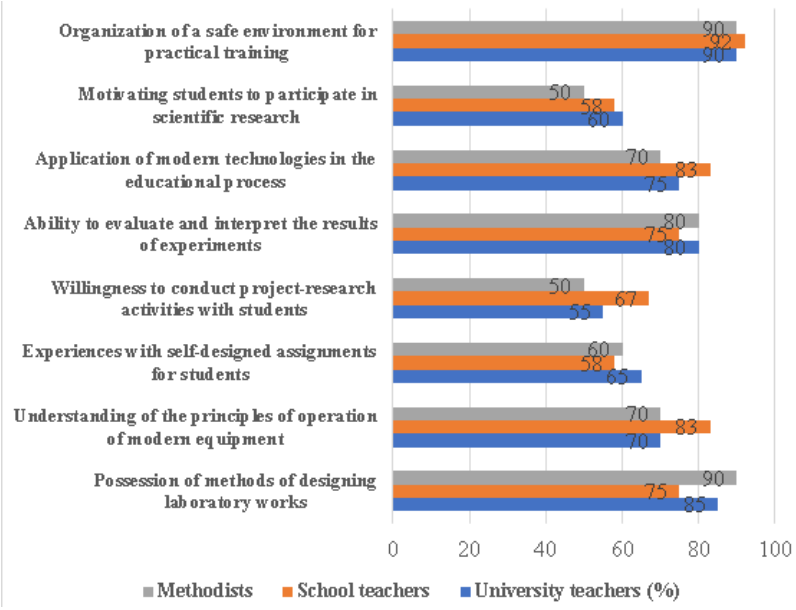

Figure 1 – Results of the expert survey

The highest attention is paid by experts to such elements as: mastery of laboratory work design methods (average value is about 83 %, the highest indicator is among teachers, the lowest is among school teachers); ability to evaluate and interpret the results of experiments (about 78 %, they were mostly evaluated by teachers and methodologists) and organization of safe environment for practical training (almost 91 %, mostly according to teachers). Elements like understanding how modern equipment works (approximately 74 %, highest among school teachers) and integrating modern technologies into the learning process (around 76 %, also higher among school teachers) show average levels overall. The area receiving the least focus is motivating students to engage in scientific research, with an average score of about 56 %, and particularly low results among teachers.

Summarizing the results of the conducted survey among experts, we can draw the following conclusions regarding the elements that form the experimental competence of a future physics teacher. The elements rated as most important by the majority of respondents highlight the significance of the technical aspects of a physics teacher's professional role, emphasizing the need for high-quality lab sessions and maintaining safety throughout the educational process. The average level of attention is marked by the fact that the availability of technological equipment and the ability to use new tools in teaching are important, but they still require additional attention in preparation for training. Low level of recognition is characterized by students' motivation to participate in scientific research, which probably indicates insufficient evaluation of the role of teachers' stimulation of students' scientific activity and may indicate that it is necessary to raise awareness of this problem among university teachers and among school teachers.

The results of testing students' level of experimental competence on individual elements of the structure and on the overall average are shown in Table 1.

Table 1 – Summarized data of the experimental group and control group at the beginning of the experiment

Element of the general competence structure / group, Level	EG			CG		
	High	Medium	Low	High	Me-dium	Low
SCF Competencies	15 %	40 %	45 %	14 %	42 %	44 %
Competencies in the area of student experi-mentation	14 %	42 %	44 %	15 %	40 %	45 %
Competencies in the field of demonstration experiment	16 %	41 %	43 %	15 %	40 %	45 %

Competencies on guiding cognitive activities	15 %	40 %	45 %	14 %	42 %	44 %
Safety Com-i ng	17 %	43 %	40 %	17 %	43 %	40 %

At the initial stage, both groups (EG and CG) show similar values of evaluation indicators for all elements of the general structure of experimental competence. In general, they are characterized by a low level of formation of most competencies. A significant number of students are at a low level of development in all areas, which indicates that it is necessary to conduct a more intensive development of these competencies in the educational process of physics teacher training.

An integration algorithm has been developed to embed the key components of experimental competence for physics teachers into the broader educational process. These components include: theoretical and conceptual understanding; practical skills and experiment planning abilities; proficiency with modern equipment and experimental technologies; the ability to guide students in independent research; and the capacity to interpret class data and evaluate research quality. Each element is clearly defined. As part of this model, it is essential to design specialized training courses that build these experimental competencies in future physics teachers, enhancing their readiness to lead experimental and hands-on activities in physics instruction, as outlined in Figure 2.

As a result, passing training, according to the designated model, allows you to get a graduate who is able to confidently and professionally organize experimental and practical work, successfully manage the process of teaching physics and actively support the creative development of students.

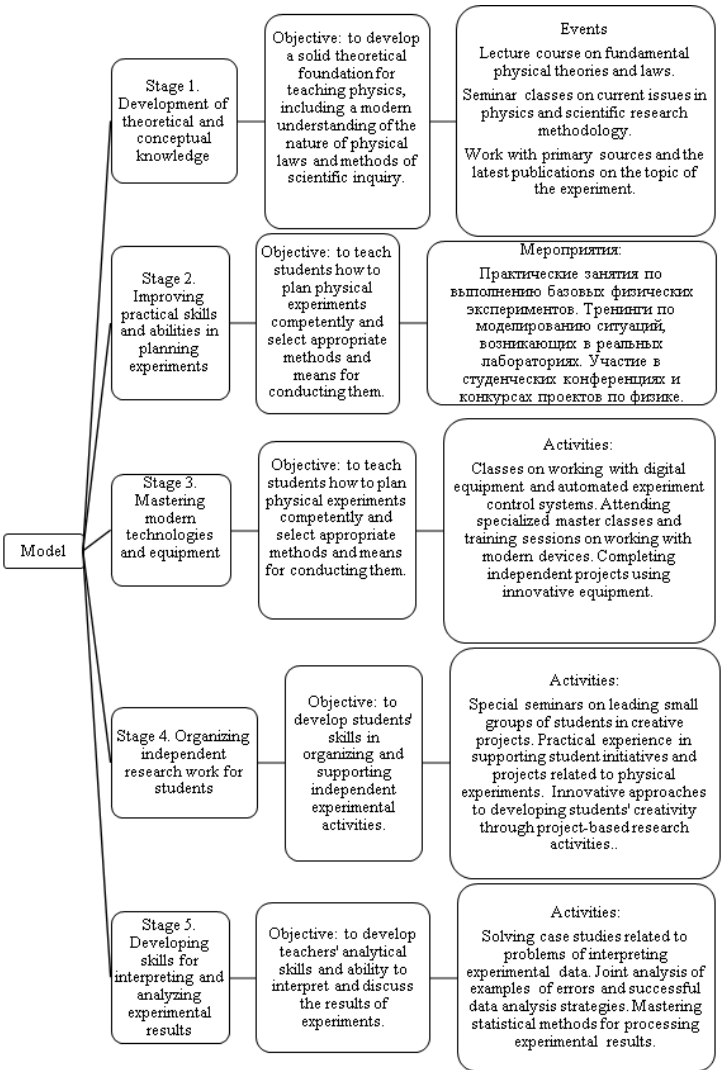

Figure 2 – Model of integration of key elements of the structure of experimental competence in the process of teaching physics

Specialized courses were developed: «Organization of experimental activity in physics teaching» and «Practice of experiment in physics lessons». Some lessons

created within the framework of these classes were tested in the experimental group. Let us show the example of the lesson on the topic «Electricity. Ohm's Law. Measurement of resistance, voltage and current»

Purpose of the lesson: to consolidate theoretical knowledge of Ohm's Law and to acquire skills in electrical measurements, data interpretation and use of laboratory equipment.

Practice Assignments:

Prepare and assemble a simple DC electrical circuit consisting of a power supply, a variable resistor, and an incandescent light bulb.

Using a multimeter, measure the current, voltage, and resistance of the circuit sections.

Plot the graphs of current versus voltage and check the validity of Ohm's law.

Practicing the elements of experiential competence:

Theoretical and conceptual knowledge: The teacher introduces fundamental electrical laws, such as Ohm's Law and the formulas I = U/R and I = U/Z, explaining the conditions under which they apply and their limitations. Students are encouraged to expand on or present their own explanations.

Practical skills and experiment planning abilities: Students design a schematic for an electrical circuit, choose appropriate multimeter settings, and identify key points for taking measurements.Skills of modern experimental equipment and technologies: use of modern digital multimeter with automatic range selection and direct display of values on the screen; calibration and adjustment of multimeter, use of auto polarity detection and automatic compensation of temperature effects; taking high-precision readings using additional expansion modules of multimeter (thermoelectric sensors, high-sensitivity probes); automated data logging with the help of the multimeter; use of the multimeter's automatic polarity detection and automatic compensation of temperature effects.

Ability to organize independent research work of students: the group divides into subgroups, each assembles its own circuit and makes an independent measurement, then share results and discuss common patterns and causes of error.

Ability to interpret the obtained data and analyze the quality of the conducted research: graphs of voltage vs. current dependence are plotted, deviations from the ideal case are discussed (non-ideality of resistances, energy losses in contacts and so on).

The algorithm and lessons ensure consistent development of all five key elements of experimental competence of future physics teachers in students, thus ensuring the transition from passive perception of information to active actions, including testing knowledge, using equipment, organizing their own research activities and interpreting results.

Table 3 shows the results of comparative analysis of the assessment of the level of formation of experimental competence in EG and CG students

Table 3 – Results of comparative analysis

Element of the general competence structure / group, Level	EG (at the beginning – at the end)			CG (beginning to end)		
	High	Medium	Low	High	Medium	Low
SCF Competencies	15 %–35 %	40 %–45 %	45%–20%	14%-18%	42%-40%	44%–42%
Competencies in the area of student experimentation	14 %–30 %	42 %–48 %	44%–22%	15%-16%	40%-40%	45%–44%
Competencies in the field of demonstration experiment	16 %–33 %	41 %–46 %	43%–21%	15%-17%	40%-38%	45%–42%
Competencies on guiding cognitive activities	15 %–32 %	40 %–49%	45%–19%	14%-16%	42%-44%	44%–40%
Safety Coming	17%–36%	43 %–44 %	40%–20%	17%-20%	42%	40%–38%

The analysis of comparative data allows us to note that the experimental group demonstrated significant growth in all indicators of experimental competence. The level of mastery of the basic competences of the school physics classroom (from 15 % to 35 %), organization of student experiment (from 14 % to 30 %), management of cognitive activity (from 15 % to 32 %) and safety (from 17 % to 36 %) increased especially strongly. The low level category significantly decreased (less than 20 %), which indicates a qualitative growth of students' training within the proposed algorithm of integration of experimental competence in the process of training future physics teachers. While in the control group there are no significant changes in any of the areas of experimental competence.

An analysis of the results from this study – compared with findings from similar research that also emphasizes the practical training of future physics teachers – highlights the shared focus on mastering experimental methods in physics lessons. While M. S. Pavlova also outlines the structure of experimental competence, she identifies different components. What sets our study apart is its comprehensive approach, integrating clearly defined structural elements into the educational process and evaluating how effectively these competencies are developed in students through real-world practice.

Conclusion

The structure of a physics teacher's experimental competence includes the following key modern elements: a solid foundation in theoretical and conceptual knowledge; practical skills in planning experiments; proficiency in using modern equipment and experimental technologies; the ability to guide students in independent research; and the capability to interpret data during lessons and evaluate the quality of the research conducted. These components define the current content of experimental competence.

The presented results of the expert survey allow us to conclude that the key elements in the structure of experimental competence of a physics teacher and the main priorities for the effective formation of experimental competence of a physics teacher should be considered to be the deepening of technical skills, improving the quality of interpretation of experimental results and strengthening the system of safety measures. At the same time, it is noted that it is necessary to intensify the work in the university to create conditions for the involvement of students in scientific activities and in the introduction of innovative approaches in the educational process.

The results obtained during the study in the EG indicate the feasibility of developing an algorithm for the introduction of specialized courses for the formation of experimental competence of students in the learning process, increasing their readiness for productive and creative experimental activity in the new conditions that are noted in modern school. In addition, the main hypothesis of the study was confirmed.

This study has identified current challenges in developing the experimental competence of future physics teachers and proposed an effective solution through an integration model. This model is based on specialized courses and the use of active, modern teaching methods, which led to measurable improvements across all components of experimental competence in the experimental group. In our view, further development of these research ideas offers promising opportunities to enhance the level of experimental competence among physics teachers in Kazakhstan.

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БОЛАШАҚ ФИЗИКА МҰҒАЛІМІН КӘСІБИ ДАЯРЛАУДАҒЫ ЭКСПЕРИМЕНТТІК ҚҰЗЫРЕТТІЛІКТІҢ ҚҰРЫЛЫМЫ МЕН МАЗМҰНЫ

Бұл мақала еліміздің жоғары оқу орындарында кәсіби даярлау процесінде физика мұғалімінің эксперименттік құзыреттілігінің құрылымы мен мазмұны саласындағы мәселелер мен перспективаларды зерттеуге бағытталған. Зерттеудің мақсаты - физика мұғалімінің эксперименттік құзыреттілігінің құрылымы мен мазмұнын зерттеу, оны қалыптастыру тиімділігін арттыру шарттарынанықтау.Негізгіидеялартұжырымдамалықаппаратты және «эксперименттік құзыреттілік» терминінің мазмұнын анықтау, эксперименттік құзыреттіліктің негізгі компоненттерін анықтау, жоғары оқу орындары студенттерінің эксперименттік құзыреттілігінің қалыптасу жағдайын бағалау және физика мұғалімдерін даярлау сапасын арттыру бойынша ұсыныстар әзірлеу болды. Нәтижесінде «эксперименттік құзыреттілік» ұғымы анықталды. Физика мұғалімінің эксперименттік құзыреттілігінің құрылымында түйінді элементтер анықталып, олардың мазмұны ашылды. Сараптамалық сауалнаманың ұсынылған нәтижелері оларды растап, жоғары оқу орнында студенттерді эксперименттік қызметке тарту және білім беру процесінде инновациялық эксперименттік тәсілдерді тәжірибеге енгізу үшін жағдай жасау бойынша жұмысты жандандыру қажеттілігін көрсетті. Ғылыми жаңалық эксперименттік құзыреттіліктің нақты құрылымдық компоненттерін ұсынуда және оларды физика мұғалімдерін даярлау

білім беру процесіне интеграциялау негізінде әдіснаманы әзірлеуде болып табылады. Эксперименттік топта зерттеу барысында алынған нәтижелер студенттердің оқу процесінде эксперименттік құзыреттілігін қалыптастыру, қазіргі мектепте байқалатын жаңа жағдайларда өнімді және шығармашылық эксперименттік қызметке дайындығын арттыру үшін мамандандырылған курстарды енгізу алгоритмін әзірлеудің орындылығын көрсетеді.

Кілтті сөздер: эксперименттік құзыреттілік, эксперименттік құзыреттілік құрылымы, жоғары білім, студенттердің кәсіби даярлауы, болашақ физика мұғалімі, интеграциялық модель.

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СТРУКТУРА И СОДЕРЖАНИЕ ЭКСПЕРИМЕНТАЛЬНОЙ КОМПЕТЕНТНОСТИ В ПРОФЕССИОНАЛЬНОЙ ПОДГОТОВКЕ БУДУЩЕГО УЧИТЕЛЯ ФИЗИКИ

Настоящая статья направлена на изучение проблем и перспектив в области структуры и содержания экспериментальной компетентности учителя физики в процессе профессиональной подготовки в высших учебных заведениях страны. Целью исследования является изучение структуры и содержания экспериментальной компетентности учителя физики, определение условий повышения эффективности её формирования. Основные идеи заключались в определении понятийного аппарата и содержания термина «экспериментальная компетентность», выявлении основных компонентов экспериментальной компетентности, оценке текущего состояния сформированности экспериментальной компетентности у студентов вузов и разработке предложений по повышению качества подготовки учителей физики. В результате определено понятие «экспериментальная компетентность». В структуре экспериментальной компетентности учителя

физики выявлены ключевые элементы, раскрыто их содержание. Представленные результаты экспертного опроса подтвердили их и показали необходимость активизации работы в высшем учебном заведении по созданию условий для вовлечения студентов в экспериментальную деятельность и внедрению в практику инновационных экспериментальных подходов в образовательном процессе. Научная новизна заключается в предложении конкретных структурных компонентов экспериментальной компетентности и разработке методологии на основе их интеграции в образовательный процесс подготовки учителей физики. Результаты, полученные в ходе исследования в ЭГ, свидетельствуют о целесообразности разработки алгоритма внедрения специализированных курсов для формирования экспериментальной компетентности студентов в процессе обучения, повышения их готовности к продуктивной и творческой экспериментальной деятельности в новых условиях, которые отмечаются в современной школе.

Ключевые слова: экспериментальная компетентность, структура экспериментальной компетентности, высшее образование, профессиональная подготовка студентов, будущий учитель физики, интеграционная модель.

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