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## TRAINING OF FUTURE TEACHING STAFF IN THE CONTEXT OF DUAL EDUCATION

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**Abstract.** In the modern educational context, dual education plays a key role in the preparation of qualified teachers. This article analyses the process of adaptation of the educational system to a rapidly changing social and economic environment, focusing on the importance of dual education for the training of teacher educators. Particular attention is paid to the integration and effective use of key principles and methods characteristic of the dual approach, emphasizing its relevance and contribution to the development of educational science and practice. The updating of educational standards required the introduction of new technologies and fostered stronger links between universities, students and schools where students start their professional activities during their studies. The article explores the theoretical foundations of dual education in the context of teacher training and analyses the situation in the Republic of Kazakhstan, being of interest to teachers and students seeking development in the field of pedagogy. Critical aspects of teacher education, including experiential learning, work-based learning and research in education, are also examined in detail. Finally, the article analyses the impact of dual training on the quality of teacher education, assessing its effectiveness.

**Keywords:** dual training, teacher training, practice, on-the-job training, pedagogical research, quality of education.

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## **ДУАЛДЫ БІЛІМ БЕРУ ЖАҒДАЙЫНДА БОЛАШАҚ ПЕДАГОГИКАЛЫҚ КАДРЛАРДЫ ДАЯРЛАУ**

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**Аннотация.** Қазіргі заманғы білім беру контекстінде дуалды оқыту педагог мамандарын даярлауда маңызды рөл атқарады. Бұл мақала әлеуметтік және экономикалық органның жылдам өзгеруіне білім беру жүйесінің бейімделу процесін талдауға арналған, дуалды білім берудің мұғалімдерді даярлаудағы маңызына ерекше назар аударады. Дуалды көзқарасқа тән негізгі принциптер мен әдістерді интеграциялау және тиімді пайдалануға арналған, оның қолданылуының қажеттілігі мен білім беру ғылымы мен тәжірибесіндегі үлесін атап өтеді. Білім беру стандарттарын жаңарту жаңа технологияларды енгізуді талап етті және жоғарғы оқу орындары, студенттер және мектептер арасында, оқу процесінде студенттер өз кәсіби қызметін бастайтын, байланыстарды нығайтуға ықпал етті. Мақала мұғалімдерді даярлау контекстінде дуалды білім берудің теориялық негіздерін зерттейді және Қазақстан Республикасындағы жағдайды талдайды, педагогика саласында дамығысы келетін мұғалімдер мен студенттер үшін қызығушылық тудырады. Сондай-ақ, педагог мамандарды даярлаудың маңызды аспектілері, оның ішінде практикалық оқыту, өндірістік процеспен тығыз байланыста оқыту және білім беру саласындағы ғылыми зерттеулер толық қарастырылады. Қорытындылай келе, мақала мұғалімдер білімінің сапасына дуалды оқытудың әсерін және оның тиімділігін бағалайды.

**Түйін сөздер:** дуалды оқыту, мұғалімдерді даярлау, практика, жұмыс орнында оқыту, педагогикалық зерттеулер, білім сапасы.

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## **ПОДГОТОВКА БУДУЩИХ ПЕДАГОГИЧЕСКИХ КАДРОВ В УСЛОВИЯХ ДУАЛЬНОГО ОБРАЗОВАНИЯ**

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**Аннотация.** В современном контексте образования дуальное обучение играет ключевую роль в подготовке квалифицированных учителей. Эта статья представляет собой анализ процесса адаптации образовательной системы к быстро меняющейся социальной и экономической обстановке, акцентируя внимание на значении дуального образования для подготовки педагогических специалистов. Особое внимание уделяется интеграции и эффективному использованию ключевых принципов и методов, характерных для дуального подхода, что подчеркивает его релевантность и вклад в развитие образовательной науки и практики. Обновление образовательных стандартов требовало внедрения новых технологий и способствовало укреплению связей между университетами, студентами и школами, где студенты начинают профессиональную деятельность в ходе обучения. Статья исследует теоретические основы дуального образования в контексте подготовки учителей и проводит анализ ситуации в Республике Казахстан, представляя интерес для учителей и студентов, стремящихся к развитию в области педагогики. Также детально рассматриваются важнейшие аспекты подготовки учителей, включая практическое обучение, обучение в тесной связи с рабочим процессом и научные исследования в образовании. В заключении, статья анализирует влияние дуального обучения на качество образования учителей, оценивая его эффективность.

**Ключевые слова:** дуальное обучение, подготовка учителей, практика, обучение без отрыва от производства, педагогические исследования, качество образования

**Introduction.** In the modern educational world, steady changes are taking place, new approaches and teaching methods are being introduced, aimed at creating high-



quality and highly effective personnel training systems. Among these innovations, dual-oriented training occupies a special place, which is becoming a key factor in the formation of competent teaching staff. This article is intended to consider the process of training pedagogical specialists in the conditions of dual-oriented education, to explore its basic principles, goals and methods, and also to assess its impact on the quality of teacher education.

Dual-oriented learning is an innovative approach that is actively developing in various countries around the world. It is based on close cooperation between educational institutions and enterprises, providing students not only with theoretical knowledge, but also with the practical skills necessary for a successful career. An important aspect of dual-oriented training is its focus on the real needs of the labor market, which allows graduates to be ready for professional challenges and truly useful to society. The main purpose of this article is to analyze and systematize information about dual-oriented training in the context of teacher training. We will look at key aspects of this teaching method, its benefits and challenges, and review successful case studies in the field. Finally, we will consider the effectiveness of dual-oriented learning and its impact on the quality of education, which will allow us to draw conclusions about its role in shaping the future of the teaching community.

Dual-oriented learning opens up new horizons for education and teacher training, and this article aims to shed light on its importance and prospects for development in the modern educational context.

**Job overview.** One of the important aspects of training computer science teaching staff is the determination of qualification requirements for future specialists, which includes both theoretical knowledge and practical skills. In the works of M.V. Perfilyeva, O.A. Belozeroва, A.A. Artyushina, I.V. Romanova considered the requirements for the qualifications of computer science teaching staff, including taking into account the development of information technologies and changes in the educational environment. (Brylevich)

An important factor that influences the effectiveness of computer science teacher training is the use of innovative approaches in the educational process. In the works of M.M. Polyakova, L.I. Lapshina, T.V. Bogdanova, M.A. Zakharova examined various methods and approaches to teaching computer science, including the use of dual learning technologies.

Dual training is an approach to organizing the educational process, which involves a combination of theoretical training in educational institutions and practical work of students in enterprises and organizations. In the works of M.N. Shestopalova, L.A. Polukhina, O.N. Mitrofanova, E.V. Belova considered the advantages and disadvantages of dual training, as well as the experience of its implementation in various countries.

One of the important aspects of training computer science teaching staff in dual education conditions is the development of a training program that must meet modern requirements and the needs of the labor market. In the works of M.M. Larionova, L.A. Polyakova, I.V. Smirnova, T.V. Solomonova reviewed the basic principles and



approaches to the development of computer science training programs for teaching staff in the conditions of dual education. An important aspect is also the selection and application of methods for assessing the effectiveness of computer science training of teaching staff in the conditions of dual education. In the works of L.I. Lapshina, M.N. Shestopalova, A.G. Khaleeva, A.I. Kiryushin discusses various methods and approaches to assessing the effectiveness of training, including both quantitative and qualitative methods.(Zhumagulov)

It should also be noted that currently more and more attention is being paid to the development of computer science competencies of teaching staff, which must meet the requirements of the modern information society. In the works of O.N. Mitrofanova, I.V. Smirnova, M.M. Polyakova, L.A. Polukhina examined various approaches to determining the computer science competencies of teaching staff and their development in the learning process.

In general, a review of the literature shows that the training of computer science teaching staff in conditions of dual education is a relevant and important problem of modern education. It is important to develop an effective training program that takes into account modern requirements and innovative approaches, as well as to apply a variety of methods and approaches to assessing the effectiveness of training and developing the competencies of computer science teaching staff.

**Concept and principles of dual-oriented learning.** Dual-Learning (DL) is an innovative educational method that emphasizes the integration of academic learning with the practical skills and experiences needed for a successful professional career. This approach creates a unique educational environment where educational institutions collaborate with businesses and organizations to provide students with full immersion in a real-life work environment.

**Principles of dual-oriented learning:**

1. **Partnership between education and business:** The fundamental principle of Electrical and Computer Engineering (ECE) is cooperation between educational institutions and enterprises. The training is co-designed and students spend part time studying and part time on the job, receiving practical experience and feedback from employers.

2. **Individual preparation:** The preschool educational institution takes into account the individual needs and abilities of students. Programs of study are designed to take into account the interests and goals of each student, giving them the opportunity to choose areas and specializations that best suit their future career.

3. **Combining theory and practice:** At the center of ECE is the idea of combining theoretical learning and practical work. Students apply the knowledge gained during their studies directly in the workplace, which helps them better understand the material and develop practical skills.

4. **Mentoring and mentoring:** Students within the preschool education have the opportunity to work under the guidance of experienced mentors and mentees. This facilitates rapid adaptation to the work environment and development of professional skills.

5. **Assessment and Feedback:** Assessment in preschool education is based on the actual achievements of students in the workplace, as well as on their academic performance. Feedback from employers and teachers plays an important role in student development.

6. **Career Development:** The preschool is focused on preparing students for a successful career. This includes assistance with job searches, preparation for interviews, development of professional skills and strengthening of professional self-identity.

7. **Constantly updating programs:** Keeping in mind the rapidly changing demands of the labor market and technological innovations, the preschool regularly updates its training programs to remain relevant and meet modern standards.

Dual-oriented learning creates a unique environment where education becomes more relevant, practical and adapted to the needs of the modern economy. This method of training is designed not only to provide graduates with the necessary skills, but also to help improve the quality of education in general. (Morozova, 2003)

In educational institutions, as well as during teaching practice, the practical work acquired through theoretical knowledge is a key factor in the effectiveness of dual training.

The training of teachers should be dual-oriented, and the use of the term «**dual-oriented training**» refers to the uniqueness and independence of the training of future professionals.

By dual-oriented training of a future teacher, we understand the synergistic process and result of the formation of knowledge, skills, abilities, which, complementing each other, provide a higher level of professional training of the future specialist for teaching activities.

We have made an attempt to formulate a categorical apparatus and determine the structural content of the system of dual-oriented training of teaching staff.

Duality as a methodological characteristic of vocational education presupposes a coordinated interaction of the educational and industrial spheres for the training of specialists of a certain profile within the framework of organizationally different forms of education, built on uniform methodological foundations.

*Dual-oriented training of teaching staff is an innovative type of pedagogical education, which involves coordinated interaction between the educational and industrial spheres for training specialists, built on the unity of three methodological foundations: axiological (parity of humanistic and technological), ontological (competency-based approach), technological (organization of the process preparation for professional activity).* Dual-oriented training of teaching staff requires coordinated interaction between the education department and the pedagogical university.

To carry out dual training of teachers, the following principles should be observed:

- Educational objectives are appropriate to the needs of modern society.
  - Implementation of interaction between educational and professional fields in the process of teacher training based on humanistic and technical approaches.

• As an expression of the systematic integrity of teacher training, ensure its integrative nature. The structural content of dual training of teachers at universities includes: - The practical technical level where the double transformation of the behavioral system in the process of teacher training appears as a technically organized educational process.

• Professional and personal levels. It reflects the subjective results of teaching as a set of professional and personal qualities and characteristics that a professional, that is, a future teacher, should possess (personal and professional competence).

In this way, dual training of teachers contributes to the development of a new type of teacher, and requires a review of the basic principles of the learning process in universities.

In order to emphasize dual training of teachers, it is necessary to systematize the training content in universities and change and review the technical organization of the learning process (changes in the learning groups in classes, educational institutions, and practical training).

Development of scientific and methodological support for continuing educational training at universities (bachelor's, master's and doctoral programs).

***Scientific and pedagogical understanding of problems development and the formation of a continuous system of teacher education through the prism of the general scientific methodological category of duality opens up new promising directions for pedagogical research in the field of professional pedagogical education.*** For example, the development of systemic curricula, modules, conceptual and terminological dictionary, criteria and procedures for monitoring the quality of education, training programs for certain training courses, teaching materials, etc.

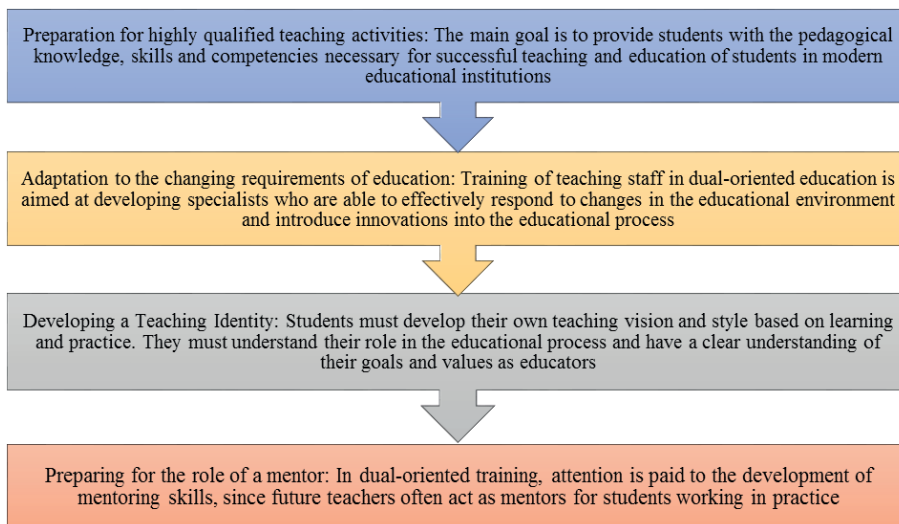
Dual training involves a combination of theoretical and practical training, in which at a university the student must master the basics of professional activity (theoretical part), and the practical part of the training takes place directly in the workplace: in schools, colleges, educational centers of the city. (Rodikov 2010)

Dual-oriented training programs for teaching staff, which can be implemented at specific workplaces in educational institutions under the guidance of college teachers and school teacher-mentors, include three main components:

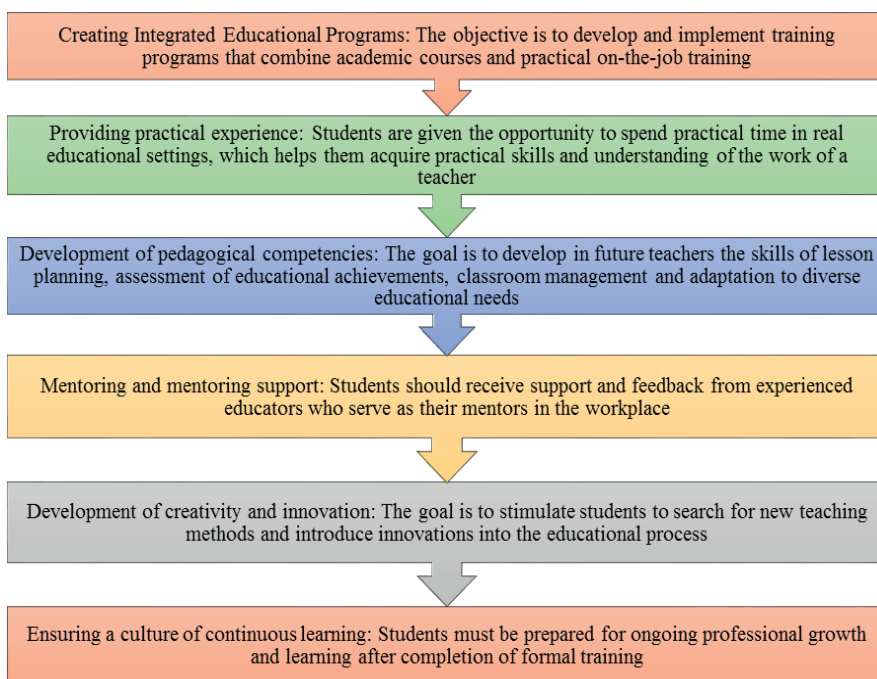
- practical and laboratory classes;
- educational, industrial (pedagogical) practice;
- extracurricular work (excursions, round tables, workshops)

### **Goals and objectives of training teaching staff in dual-oriented education.**

The training of teaching staff in the context of dual-oriented education has a number of specific goals and objectives that are aimed at developing competent and qualified teachers who are able to work effectively in a modern educational environment. Let's look at the main goals and objectives of this process:



Picture 1. Goals of teacher training in dual-oriented education



Picture 2. Objectives of training teaching staff in dual-oriented education

Training of teaching staff in dual-oriented education contributes to the creation of a new generation of teachers who are ready for the challenges of modern education and provide high quality education for future generations. (Sukhorukova 2005)

**Methodology.** To conduct our research, we selected two groups of students from a pedagogical university who studied in the specialty “Computer Science and

Information Technologies in Education.” One group studied in the traditional form of education, and the other in the form of dual education.

Students in both groups were randomly selected and had similar backgrounds in computer science. All students were tested in computer science before starting the study to assess their initial level of knowledge.

Both groups underwent the same computer science course, which included both theoretical and practical training. The only difference was that students undergoing dual training also underwent internships in IT companies and participated in project activities.

The Model regulation on mentoring fixes the status of the mentor, his functions, the procedure for selecting candidates, requirements for professional competencies, algorithms for the development of mentoring, a system for assessing the professional activities of mentors. In accordance with the second pedagogical contract, a questionnaire has been developed, which includes determining the competencies of students in the direction and profile of training and a list of job requirements of the employer (Table 1).

Table 1. Extract from the list of employer’s job requirements

№	Qualification requirements of the employer	Explanation provided by the employer
1	Participation in the development of the main general educational program of the educational organization in accordance with the state educational standard	
2	Participation in the creation of a safe and psychologically comfortable educational environment of an educational organization by ensuring the safety of children's lives	
3	Organization of cognitive, creative educational activities	
4	Organization of pedagogical monitoring of children's assimilation of the educational program and analysis of educational work	
5	Analysis of the effectiveness of training sessions	
6	Use of ICT tools	
7	Implementation of professional activities in the process of changing the purpose, content of education and replacing technologies	

After completing the course, we conducted another test in computer science to assess the level of knowledge of students after completing the course. We also conducted a survey of students to assess their motivation and interest in learning computer science.(Fedotova)

To analyze the results, we used statistical methods including analysis of variance and t-test. The results of the analysis showed a significant difference in the level of knowledge and motivation between the two groups of students.

The choice of two groups of students - the traditional form of education and dual education - was based on our hypothesis that dual education may be a more effective way of training computer science teaching staff.

To form groups of students, we used random sampling. We randomly selected

students from a pedagogical university who were studying in the specialty “Computer Science and Information Technologies in Education.” Then we divided the students into two groups: traditional form of education and dual education.

Students in the traditional education group took regular computer science courses, which included both theoretical and practical classes. At the same time, students in the dual education group completed internships in IT companies and participated in project activities, in addition to academic classes. (Agranovich, 2001)

The selection of such groups of students allowed us to evaluate the differences in the effectiveness of traditional and dual training in the training of computer science teaching staff.

Performance assessment criteria: test results, level of knowledge and skills, level of motivation

To evaluate the effectiveness of traditional and dual training, we used the following criteria:

Test results	<ul style="list-style-type: none"><li>• we tested students before the start of training and after its completion. This allowed us to assess changes in students' knowledge level.</li></ul>
Level of knowledge and skills	<ul style="list-style-type: none"><li>• we assessed the level of knowledge and skills of students based on the completion of practical tasks as part of training courses and project activities.</li></ul>
Motivation level	<ul style="list-style-type: none"><li>• We conducted a survey of students to assess their level of motivation during the learning process. We used standard questionnaires that allow us to assess the level of students' motivation and their interest in learning</li></ul>

After the training, we compared the results in the groups of the traditional form of training and dual training. We used statistical methods to determine differences in students' knowledge and skills, as well as in their motivation.

The results of the study showed that students who studied in the dual system showed significantly better results in testing and had a higher level of knowledge and skills than students who studied in the traditional form. In addition, students in the dual learning group showed greater interest in learning and had a higher level of motivation.

Thus, the results of our study confirmed the hypothesis that dual training may be a more effective way of training computer science teaching staff. (Anikeev, 2012)

**Practice and on-the-job training in dual-oriented training.** In the modern world of information technology, the training of qualified computer science teaching staff is an urgent problem in education. The modern educational process requires teachers to have deep knowledge and skills in the field of computer science, as well as the ability to use the latest technologies and teaching methods. In light of these requirements, there is a need to develop effective methods for training computer science teaching staff. One of the innovative teaching methods is dual training,



which allows students to provide practical experience in the field of computer science, as well as integrate them into real projects. Dual training is an effective tool for developing students' professional skills and training qualified specialists in the field of computer science.

In modern society, information technologies play a key role in various fields of activity, from economics to science. Information technology personnel are becoming increasingly in demand; their shortage is one of the main problems in the development of the information society. In Kazakhstan, there is a significant shortage of computer science personnel, which complicates the development of many sectors of the economy and society as a whole. The role of computer science educators is especially important because they are responsible for training the next generation of computer scientists. However, a lack of trained teachers in the field of computer science is also present in Kazakhstan.

Dual training is an effective approach in training computer science teaching staff, allowing students to combine theoretical training at a university with practical work in real IT companies and other organizations. This approach helps students gain the necessary experience in a professional environment and develop practical skills that can be applied in future professional activities.

**Evaluating the effectiveness of dual-oriented training.** Assessing the effectiveness of dual-oriented education (DOO) is an important stage in the process of its implementation and development. It ensures that this teaching method achieves its intended objectives and benefits students, educational institutions and employers. (Kuzembaev, 2013) Here are some key aspects of assessing the effectiveness of an ECE center:

1. Level of achievement of educational goals:

· To assess the effectiveness of preschool educational institutions, it is necessary to determine specific educational goals and expected results. This may include the level of knowledge, skills and competencies that students are expected to achieve as a result of their training. Assessment should be based on objective data such as assessments, tests and professional certifications.

2. Comparison with traditional teaching methods: To evaluate the effectiveness of preschool education, it is useful to conduct a comparative analysis with traditional teaching methods. This may include comparisons of students' performance, their level of preparation, and their level of satisfaction with the training.

3. Feedback from students and teachers: Collecting feedback from students and teachers is an important tool for assessing the effectiveness of preschool education. Students can express their opinions on the quality of teaching, the practicality of the methods and their satisfaction with the process. Teachers can also share their observations and suggestions for improving methods.

4. Monitoring the practical application of knowledge: Evaluating the effectiveness of preschool education also includes monitoring how students apply their knowledge and skills in practice. This may include tracking their progress in the labor market, employment rates and professional development.



5. Study of the impact on educational institutions and society: Assessing the effectiveness of preschool education also includes studying its impact on educational institutions and society as a whole. This may include analysis of changes in curricula, resources and educational structure, as well as assessment of economic and social benefits to society.

6. Continuous improvement: Evaluating the effectiveness of preschool education should be a continuous process that allows weaknesses to be identified and improvements introduced. Pedagogical methods and training programs can be regularly adapted and improved based on data and experience.

Evaluating the effectiveness of preschool educational institutions helps ensure the quality of education and satisfaction of needs students and the effectiveness of investments in education. This also contributes to the development of innovation in educational programs and methods, which is important for preparing students for modern challenges and labor market requirements. (Muratov, 2008)

Evaluation of the effectiveness of preschool education should be carried out systematically and be focused on specific educational goals and objectives. It should include both quantitative and qualitative data, and also take into account feedback from all participants in the educational process.

In addition, assessing the effectiveness of preschool education allows institutions and organizations to optimize their educational programs, identify successful teaching methods and best practices, and identify the needs of students and the labor market to more accurately adapt educational programs.

Thus, assessing the effectiveness of dual-oriented education is an integral part of the process of its development and improvement, ensuring high-quality training of students and compliance of educational programs with modern needs and expectations. (Rodikov, 2010)

**Conclusion.** Dual-Based Education (DBE) is a powerful method for training computer science professionals that successfully combines theoretical learning and practical experience. This article examined the key aspects of dual-oriented training in the training of computer scientists, as well as methods for its implementation and evaluation of effectiveness.

One of the key conclusions that can be drawn from the issues discussed is that preschool education allows students to acquire not only theoretical knowledge, but also real-life experience, which significantly increases their competitiveness in the labor market. Practical internships, projects, simulations and other active learning methods make education more practical and adapted to modern challenges in the information industry.

In addition, the effectiveness of preschool educational institutions is confirmed by many studies that show improvements in student achievement, the level of employment of graduates and their professional development. (Teshev, 2014)

However, it is important to emphasize that preschool education is a dynamic and developing area of education, and its effectiveness requires constant monitoring and evaluation. Continuous improvement of programs and teaching methods, adaptation

to the changing needs of the labor market and society are an integral part of the successful implementation of preschool education.

In conclusion, we can say that dual-oriented training has a positive impact on the training of computer scientists, enriching them with knowledge, skills and experience, which makes them more successful and ready to solve complex problems in the field of information technology.

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