

Mikhailova Valentina Sergeevna

teacher

Karaklinskaya secondary school

Karakly village, Chuvash Republic

INTEGRATION OF SCIENCE AND PRACTICE IN EDUCATION: FROM THEORY TO MODERN MODELS OF INTERACTION

Abstract: *the article examines cooperation between science and practice as a key mechanism for the modernization of contemporary education. It analyzes the theoretical foundations of integrating scientific knowledge and pedagogical practice, the forms and models of scientific-practical interaction, and the main problems hindering effective cooperation. Particular attention is paid to the «School – University – Science – Industry» model as a systemic solution to the task of bridging the gap between theory and practice. Examples of successful implementation of cooperation projects in Russian education are provided.*

Keywords: *cooperation, integration of science and practice, modernization of education, scientific-practical interaction, research competence of the educator, educational ecosystem.*

Михайлова Валентина Сергеевна

учитель

МБОУ «Караклинская СОШ»

д. Караклы, Чувашская Республика

ИНТЕГРАЦИЯ НАУКИ И ПРАКТИКИ В ОБРАЗОВАНИИ: ОТ ТЕОРИИ К СОВРЕМЕННЫМ МОДЕЛЯМ ВЗАИМОДЕЙСТВИЯ

Аннотация: *в статье рассматривается сотрудничество науки и практики как ключевой механизм модернизации современного образования. Анализируются теоретические основы интеграции научных знаний и педагогической практики, формы и модели научно-практического взаимодействия, а также основные проблемы, препятствующие эффективному сотрудничеству. Особое внимание уделяется модели «Школа – университет – наука – промышленность»*

как системному решению задачи преодоления разрыва между теорией и практикой. Приводятся примеры успешной реализации проектов сотрудничества в сфере образования в России.

Ключевые слова: *сотрудничество, интеграция науки и практики, модернизация образования, научно-практическое взаимодействие, исследовательская компетентность педагога, образовательная экосистема.*

Introduction.

The current stage of education development is characterized by the growing complexity of tasks facing educational systems. The classical model, oriented primarily toward transmitting ready-made knowledge, no longer meets the requirements of a rapidly changing world. In the context of digital transformation, accelerating technological change, and growing demand for specialists capable of innovative activity, the problem of bridging the gap between scientific knowledge and pedagogical practice is becoming especially urgent.

Cooperation between science and practice is not simply one of the directions for improving education, but a fundamental principle of its modernization. As recent research notes, solving urgent educational tasks requires cooperation with representatives of government structures, academic partners, large business, and the regional education system. It is the integration of efforts of all subjects of the educational process that makes it possible to create conditions for training specialists capable of both implementing applied projects and conducting scientific research.

The purpose of this article is to examine cooperation between science and practice as a systemic mechanism for the modernization of education, identify its theoretical foundations, analyze existing models and forms, and also outline problems and prospects for development.

Theoretical foundations of cooperation between science and practice.

The scientific significance of activity-based cooperation in education is due to its ability to overcome the key contradictions of the modern system of personnel training. Drawing on the theory of activity developed in Russian psychology and the principles

of collective learning activity, cooperation transforms disparate efforts into a purposeful system in which university knowledge, school practice, and scientific inquiry are combined into a single educational trajectory.

Unlike traditional models, in which the division of labor between theoreticians and practitioners dominates, activity-based cooperation eliminates the isolation of subjects and forms a shared educational space. This fundamentally changes the very logic of the educational process: knowledge ceases to be alienated from practice, and practice is enriched by scientifically grounded approaches.

Foreign studies also confirm that the integration of educational methods based on research data into school practice improves students' educational outcomes. Awareness of the need for an evidence-based approach in education is now higher than ever, and educators demonstrate readiness and interest in working with research data.

Thus, the theoretical basis of cooperation between science and practice is the idea that quality education is possible only under the condition of an organic unity of theoretical knowledge and practical activity, which is reflected in the competence-based approach and the system-activity paradigm.

Forms and models of scientific-practical cooperation.

An analysis of Russian and foreign experience allows us to identify several main forms and models of cooperation between science and practice in education.

The «School – University – Science – Industry» model represents the most systemic approach to organizing scientific-practical interaction. This model presupposes the establishment of close ties between school, university, scientific organizations, and the real sector of the economy, which makes it possible to train competitive specialists capable of leading the country into the future. The key elements of this model are the development of mechanisms for four-way integration, support for the real sector of the economy to improve the quality of education, and the creation of conditions for the development of students' project and research skills.

Scientific-educational-industrial partnership presupposes interaction between a university and institutions of general, higher, and vocational education, scientific communities, and organizations of the real sector of the economy within the framework of

joint educational, scientific, innovative, and social projects. This model solves a whole range of tasks: increasing the mobility of students and teaching staff, adapting educational programs to the real needs of the labor market, and integrating the educational process with scientific-technological and research programs.

Industrial postgraduate studies represent a form of deep integration between a scientific organization and an enterprise. Research topics are directly tied to the applied tasks of companies, and training programs are developed jointly. Enterprises provide their production facilities for research, participate in candidate selection, and take part in entrance examinations. This model is especially relevant for fields where scientific developments are directly introduced into production – in engineering industries, IT, biomedicine, and the high-tech sector.

World-class research and educational centers (RECs) unite universities, research institutes, and companies. At present, there are 15 such centers in 36 regions, involving more than 600 organizations. These centers are aimed at integrating science, education, and production, strengthening regional scientific potential, and facilitating technology transfer.

The «Mega-Lesson» project is an example of cooperation in pedagogical tech-noparks. The project brings together teachers, university faculty, and students to develop interdisciplinary classes in a blended learning format. The main goal is to create a virtual community of educators from different regions who jointly design lessons that integrate natural science knowledge with elements of technology and the humanities. In 2024, 34 schools participated in the project, involving over 800 students and 47 educators.

Problems and challenges of scientific-practical cooperation.

Despite its obvious advantages, cooperation between science and practice faces a number of problems that require systemic solutions.

Communication problems are among the most significant. Researchers note a lack of trust between partners, unclear definition of roles and coordinators, and divergent goals of cooperation. Universities and schools represent «two separate knowledge

communities with unique cultural and historical practices and traditions,” which complicates effective interaction.

Differences in ideas about scientific research between teachers and higher education faculty create an additional barrier. Practicing educators often perceive scientific research as something disconnected from their daily work, while researchers do not always take into account the real conditions of school practice.

Lack of resources – financial, human, and temporal – significantly limits opportunities for cooperation. Teachers often do not have time to participate in research activities, schools do not have the necessary equipment, and universities cannot always provide sufficient methodological support.

For Russian education at the present stage, discreteness, fragmentation, and autonomy are characteristic, due to the lack of a formed holistic system of successive connections between levels of education. Irregular interaction between school and university appears insufficient for quality teacher training and for the formation of the competencies declared in the professional standard.

The absence of a format for continuity leads to a situation of a «double gap,” as a result of which a student of a pedagogical university finds themselves between two uncoordinated environments: theoretical and practical. The school, accepting the student as a trainee, often does not include them in its stable system of educational relations.

Bureaucratic barriers also significantly complicate cooperation. The complex administrative system and high fines for failure to meet grant deadlines worry entrepreneurs who are ready to invest in science. The model of interaction between universities and business is still developing, few successful cases have accumulated, and interaction mechanisms require careful adjustment and adaptation to the specifics of partners.

Ways to modernize education on the basis of cooperation between science and practice.

Overcoming the identified problems and realizing the potential of cooperation between science and practice require a comprehensive approach to the modernization of education.

Creating a «third space» – a space beyond the university and the school, where the main focus is on aligning partnership goals, exchanging ideas, knowledge, and resources, and developing flexible innovative approaches to solving practical educational problems. Such a space makes it possible to overcome institutional barriers and create conditions for equal dialogue among all participants.

Institutionalization of cooperation presupposes the transformation of initiative practices into sustainable institutional mechanisms, enshrined in the strategic documents of educational organizations and regions. An example is the inclusion of cooperative formats in comprehensive action plans at the level of federal subjects, which ensures the sustainability of the model and the possibility of scaling it.

Developing the research competence of educators is a necessary condition for effective cooperation. The main functions of scientific-practical interaction for schools include the adoption of innovations by teachers and their introduction into practice, teachers conducting their own research, generalizing experience, generating new knowledge, and improving educators' competence. Preparing educators to formulate research topics, prepare the scientific apparatus, and determine methodology and research methods should become an integral part of pedagogical education.

Developing network forms of learning and transitioning from traditional pedagogical technologies to creating an integrative educational space within the university ecosystem represents an important direction of modernization. Network programs make it possible to combine the resources of different educational organizations, providing broader access to quality education.

Involving employers in the implementation of educational programs, including the development of applied project-based learning, the formation of joint research centers, departments, and laboratories, and the inclusion of employer representatives in coordination councils. This makes it possible to achieve a synergetic effect both in professional training and in youth employment.

A modern university should not only graduate students and conduct research, but also actively engage in technology transfer, launch startups, and promote its developments on the market. In this context, universities are viewed as important centers of

regional innovation systems, participating in the creation of technoparks, business incubators, and laboratories jointly with industry.

Conclusion.

Cooperation between science and practice is not simply one of the directions for improving education, but a fundamental principle of its modernization. An analysis of theoretical foundations and practical experience shows that it is the integration of scientific knowledge and pedagogical activity that makes it possible to overcome the key contradictions of the modern education system.

The considered models – from industrial postgraduate studies to world-class research and educational centers – demonstrate the diversity of forms of cooperation, each of which solves specific tasks. However, all of them are united by a common goal: creating conditions for training specialists capable of innovative activity and solving complex professional tasks.

Overcoming existing problems – communication barriers, differences in ideas about scientific research, lack of resources, bureaucratic obstacles – requires a systemic approach, including the creation of a «third space» for equal dialogue, institutionalization of cooperation practices, development of educators' research competence, and active involvement of employers in the implementation of educational programs.

Cooperation between science and practice is a path that allows education to respond to the challenges of modernity, train specialists of a new type, and ensure the sustainable development of national educational systems. The implementation of this path requires joint efforts of all subjects of the educational process: educators, researchers, administrators, business representatives, and the state.

Список литературы

1. Опыт взаимодействия школ и университетов в научной сфере за рубежом / С. М. Ситяева, С. В. Яремчук, А. В. Бакина, В. А. Шмакова // Отечественная и зарубежная педагогика. – 2022. – № 4. – URL: <https://cyberleninka.ru/article/n/opyt-vzaimodeystviya-shkol-i-universitetov-v-nauchnoy-sfere-za-rubezhom> (дата обращения: 01.10.2026). – Текст : электронный.

2. Сдобняков, В. В. Научно-образовательно-индустриальное партнерство как механизм построения будущего/ В. В. Сдобняков // Концепт. – 2025. – № 4. – URL: <https://cyberleninka.ru/article/n/nauchno-obrazovatelno-industrialnoe-partnerstvo-kak-mehanizm-postroeniya-buduschego> (дата обращения: 01.10.2026). – Текст : электронный.