

**FEATURES OF THE DEVELOPMENT OF INTELLECTUAL ABILITIES OF  
FUTURE PRIMARY SCHOOL TEACHERS BASED ON AN INTERDISCIPLINARY  
APPROACH**

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**Abstract:** The article examines the features of developing the intellectual abilities of future primary school teachers through an interdisciplinary approach. It is substantiated that the intellectual development of a future teacher is associated with the formation of interdisciplinary competence, metacognition, and the ability to analyze pedagogical situations. Special attention is paid to the application of TRIZ technologies, in particular to the techniques of identifying and resolving contradictions and the ideal final result, which contribute to systems thinking, meaningful instructional design, and the development of students' cognitive independence.

**Keywords:** intellectual abilities, future primary school teachers, interdisciplinary approach, native language, critical thinking, creative thinking, reflection, interdisciplinary competence, TRIZ technologies, metacognition.

**ОСОБЕННОСТИ РАЗВИТИЯ ИНТЕЛЛЕКТУАЛЬНЫХ СПОСОБНОСТЕЙ  
БУДУЩИХ УЧИТЕЛЕЙ НАЧАЛЬНЫХ КЛАССОВ НА ОСНОВЕ  
ИНТЕРДИСЦИПЛИНАРНОГО ПОДХОДА**

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**Аннотация:** в статье рассматриваются особенности развития интеллектуальных способностей будущих учителей начальных классов на основе интердисциплинарного подхода. Обосновывается, что интеллектуальное развитие будущего педагога связано с формированием междисциплинарной компетентности, метапознания и способности к анализу педагогических ситуаций. Особое внимание уделяется применению ТРИЗ-технологий, в частности приёмам выявления и разрешения противоречий и идеального конечного результата, которые способствуют системному мышлению, осмысленному проектированию обучения и развитию когнитивной самостоятельности студентов.

**Ключевые слова:** интеллектуальные способности, будущие учителя начальных классов, интердисциплинарный подход, родной язык, критическое мышление, творческое мышление, рефлексия, междисциплинарная компетентность, ТРИЗ-технологии, метапознание.

**INTRODUCTION.** Modern pedagogical science is increasingly oriented toward the development of the learner's personality as an intellectually active subject of cognition rather than a passive recipient of knowledge. This shift is particularly significant in teacher education, where the professional quality of future teachers directly determines the intellectual culture of the next generation. A primary school teacher is not merely a transmitter of subject content; they are an organizer of children's thinking, a mediator between knowledge and cognition, and a designer of educational environments. Therefore, the intellectual abilities of future teachers become a strategic pedagogical priority.

Intellectual abilities are interpreted as an integrative system of cognitive processes that ensure productive mental activity: analysis, synthesis, comparison, abstraction, generalization, critical evaluation, forecasting, and creative transformation of information. These abilities form the basis of pedagogical thinking, which includes the capacity to understand complex educational situations, identify cause-and-effect relationships, and make pedagogically appropriate decisions. Intelligence in this context is not reduced to academic achievement; it encompasses metacognition, reflexivity, flexibility of thinking, and the ability to operate within uncertain and interdisciplinary contexts.

Educational transformations of the 21st century - digitalization, knowledge expansion, interdisciplinary integration of sciences, and the shift toward competence-based models demand teachers who can think systemically and beyond disciplinary boundaries. Consequently, the interdisciplinary approach is recognized as a methodological foundation for intellectual development. It ensures not only content integration but also the formation of a holistic worldview and the ability to transfer knowledge between contexts [1].

Historically, the idea of intellectual education has deep pedagogical roots. Adolph Diesterweg emphasized that true education develops mental powers rather than merely transmitting information, assigning the native language a central cognitive role [2]. Modern psychology confirms this position. According to the structural-dynamic theory of intelligence, intellectual functions develop through interaction with the environment and form a dynamic system rather than isolated skills [3]. Thus, intellectual growth of future teachers requires an educational environment that stimulates problem solving, reflection, and interdisciplinary synthesis.

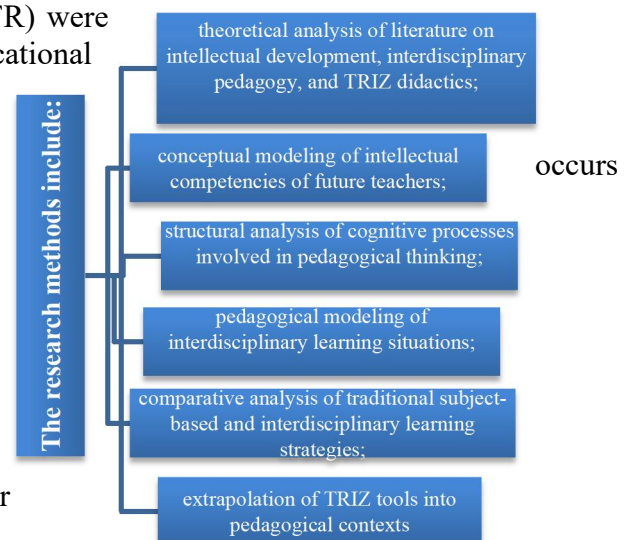
However, interdisciplinarity alone is insufficient if learning remains reproductive. The development of productive thinking requires technologies that activate conscious intellectual effort. TRIZ (Theory of Inventive Problem Solving) provides such a cognitive framework. Originally developed for engineering creativity, TRIZ has demonstrated significant pedagogical potential, particularly in forming systemic, analytical, and creative thinking. **The aim of this study** is to theoretically substantiate and pedagogically model the development of intellectual abilities of future primary school teachers through the integration of the interdisciplinary approach and TRIZ technologies.

**METHODS.** The study is theoretical and methodological in nature and is based on interdisciplinary synthesis of pedagogy, psychology, and educational methodology.

The modeling focused on teacher-training courses in native language methodology integrated with natural sciences, reading literacy, and social studies. TRIZ techniques of contradiction analysis and Ideal Final Result (IFR) were applied as cognitive instruments within educational design.

**RESULTS.** The study demonstrates that intellectual development of future teachers most effectively under three pedagogical conditions: cognitive complexity, interdisciplinary integration, and reflexive regulation of thinking.

**First,** interdisciplinary integration transforms knowledge into a network of meanings. When the native language is connected with science, history, and culture, language becomes a cognitive instrument for



structuring reality. Students learn not only linguistic norms but also conceptual modeling of the world. This promotes abstraction, generalization, and analytical reasoning.

**Second**, project-based and problem-based tasks within interdisciplinary contexts activate higher-order thinking. Educational projects that combine linguistic analysis with scientific explanation or cultural interpretation require synthesis of heterogeneous information. Students learn to justify conclusions, evaluate sources, and construct arguments - core components of critical thinking.

**Third**, TRIZ technologies intensify intellectual processes by introducing structured cognitive challenges.

The **method of identifying and resolving contradictions** encourages students to perceive pedagogical situations as dynamic systems. In interdisciplinary lessons, contradictions arise naturally: precision vs. accessibility, creativity vs. standardization, individuality vs. collective organization. Analyzing such tensions develops dialectical thinking, systemic perception, and the ability to search for non-standard solutions. The student learns to treat contradictions not as obstacles but as sources of development.

The **Ideal Final Result (IFR)** technique functions as a mental model of optimal pedagogical design. By imagining an educational situation where learning occurs naturally, efficiently, and independently, future teachers develop forward-looking and systemic thinking. IFR shifts focus from problem fixation to resource identification within the system. Students learn to see hidden didactic opportunities in content, environment, and learners' activity.

Together, these mechanisms foster four interconnected intellectual competencies:

- ✓ critical thinking - evaluation and argumentation;
- ✓ creative thinking - generation of original pedagogical solutions;
- ✓ reflexivity - awareness of one's own cognitive strategies;
- ✓ interdisciplinary competence - integration and transfer of knowledge.

**DISCUSSION.** The results confirm that intellectual abilities are not formed through information accumulation but through cognitive activity in complex, meaningful contexts. The interdisciplinary approach provides semantic richness, while TRIZ supplies cognitive structure. Their combination reflects the systemic nature of intelligence development described in psychological theories [3].

Interdisciplinary learning stimulates metacognition because students must monitor how knowledge from different domains interacts. TRIZ further strengthens metacognitive awareness by making thinking strategies explicit. Students learn *how* they think, not only *what* they think.

This synergy also supports professional identity formation. Future teachers begin to view pedagogical activity as design work requiring analysis, forecasting, and reflection. Research on interdisciplinary projects confirms their effectiveness in developing pedagogical competencies [4]. Thus, TRIZ acts as a cognitive amplifier of interdisciplinarity.

**CONCLUSION.** The development of intellectual abilities of future primary school teachers requires pedagogical environments that combine integration of knowledge with technologies of conscious thinking. The interdisciplinary approach creates a holistic cognitive space, while TRIZ techniques ensure structured intellectual engagement. Their integration promotes systemic, critical, and creative thinking, reflexivity, and the ability to design pedagogical processes purposefully.

The transition from fragmented subject learning to interdisciplinary cognitive activity represents a key condition for the formation of intellectually mature teachers capable of working in complex educational realities. Intellectual development thus becomes not an additional outcome but the central goal of modern teacher education.

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