Subject Training in a New Way: From “Knowledge of the Subject” to “the Subject as a Means”

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Annotation

In this article I show how subject preparation in the pedagogical university must be restructured in the CCFP paradigm. My key thesis: the subject-matter student must master not only the content of his discipline, but also the meta-subject potential of each topic - what exactly and how exactly it develops. Drawing on the CCFP model presented in previous articles of the series, on an analysis of contemporary requirements for pedagogical education, on current research of 2024-2026, as well as on John Dewey's ideas about the "psychologizing of subject content," I substantiate that traditional subject preparation, focused on the transmission of knowledge, must give way to preparation in which subject content becomes a means of developing thinking. I propose concrete principles for the restructuring of subject methodologies for different faculties, show how the principle of the "dual purpose of a topic" becomes the unit of instructional design, and substantiate that priority in this design must be given to the development of the mechanisms of the core. I also show the necessity of inter-faculty modules as a space where subject specificity meets the common meta-subject framework.

Keywords: subject preparation, meta-subject character, principle of dual purpose, psychologizing of the subject, pedagogical education, architect of thinking, core and support, subject methodology.

Introduction: Why the Subject Must Become a Means, and Not a Goal

In previous articles of this series I substantiated that the pedagogical university must prepare not a "subject specialist," but an "architect of thinking" [1], and that the core of this architect's professional competence is the eleven mental mechanisms [2]. I also showed that without diagnostic competence the teacher works blindly [3]. Now I must answer the question that inevitably arises in anyone reading these articles: what about the subject? The philology student must know the Russian language and literature. The mathematics student - mathematics. The history student - history. Do I propose to abandon subject preparation? No. I propose not the abandonment of the subject, but a change in its status. The subject must cease to be the goal of preparation and become a means. A means of developing thinking. A means of forming mental mechanisms. A means through which the student learns to think.

It is like looking at a musical instrument. One can learn all the scales and etudes and know the structure of every key and every string - and at the same time not be able to play music. One can know the history of music, the biographies of composers, and the theory of harmony - and not hear how a symphony sounds. Subject preparation in its traditional form often resembles precisely this: the student knows the "what," but does not know the "how" - how thought is born from this knowledge, how the subject becomes an instrument of cognition. As John Dewey wrote back in 1904, subject content must not be regarded as a fixed corpus of knowledge, but as a developing process including the methods of teaching. Moreover, as contemporary researchers note, Dewey's developing ideas - that "subject content, if taught beyond the common and superficial level, includes the development of thinking abilities in students - such as analysis, the generation of hypotheses, disciplining, and expansion" - remain extremely relevant. The subject is "the most important intellectual resource for the development of thinking" [9]. It is precisely this understanding that I place at the basis of the restructuring of subject preparation.

Research confirms that contemporary challenges require from pedagogical education "not simply adaptation, but anticipatory development" [6]. The All-Russian Pedagogical Forum "Teacher - 2040," held in December 2025 at MSPU, was devoted precisely to this theme - "the new in subject-methodological preparation." At the forum "current

tasks of teacher preparation and the most important directions of change in the content of pedagogical education" were discussed [5]. The rector of Herzen University, Sergei Tarasov, emphasized: "The high quality of subject and methodological preparation of students and graduates... is the key task of pedagogical universities" [6]. But the key question is - the quality of what? The quality of knowledge of the subject, or the quality of mastery of the subject as an instrument for developing thinking? My answer is the second.

What the "Psychologizing of Subject Content" Is

I introduce this concept not by chance. It goes back to John Dewey, who insisted that subject content must be "psychologized" - that is, rethought from the point of view of how it works in the student's consciousness, how it develops his thinking [9]. What does this mean for the pedagogical university? It means that every subject discipline, every course, and every topic must be analyzed not only from the point of view of "what needs to be known," but also from the point of view of "which mental mechanism this develops." Moreover, in the CCFP model priority must be given to the mechanisms of the core (MM-1, MM-3, MM-5, MM-6, MM-10, MM-11), since it is precisely they that constitute the act of thinking. The philology student studies not simply "the topic 'Complex Sentence'," but also how work with complex sentences develops the ability to build cause-and-effect relationships (MM-1) and critical thinking (MM-6). The mathematics student studies not simply "the Pythagorean theorem," but also how its proof develops logical thinking (MM-1) and the capacity for abstraction. The history student studies not simply "the causes of the First World War," but also how the analysis of these causes develops the ability to see the multiplicity of interpretations (MM-6) and strategic thinking (MM-11). As a 2025 study notes, "meta-subject character is legislatively defined as a category expressing the results of the mastery of educational programs" [10]. But in pedagogical education this category must become not simply a "result," but a principle of the organization of all content. Researchers also emphasize that "the successful development of critical and creative thinking abilities requires a balanced approach combining structured support systems, innovative pedagogical strategies and technological infrastructure" [10]. The psychologizing of subject content is precisely that "structured system of support" which allows the teacher to see in every element of the subject an instrument for the development of thinking.

The Principle of the "Dual Purpose of a Topic"

In article 1 of Issue 4, "Introduction: How Subjects Become Instruments for the Development of Thinking," I introduced the principle of the "dual purpose" of a lesson: every lesson must simultaneously solve two tasks - the subject task and the meta-subject task [4]. Now I must show how this principle becomes the unit of the design of subject preparation in the pedagogical university. What is the "dual purpose of a topic"? It means that for each topic in the curriculum of the pedagogical university the following must be fixed: subject content - what exactly must be known and be able to be done within the framework of this topic; meta-subject potential - which mental mechanisms (with an accent on the core) are developed through the mastery of this topic; the methodology of actualization - how exactly the instruction must be organized so that this potential is realized.

I will give an example for the philology faculty. The topic "Complex Sentence": subject content - types of complex sentences and punctuation marks; meta-subject potential (core) - MM-1 (cause-and-effect relationships, understanding of logical relations between parts) and MM-6 (critical thinking, analysis of the structure of an argument); the methodology of actualization - not simply parsing according to schemes, but an analysis of how authors use complex sentences to build argumentation. Or the topic "Essay-Reasoning": subject content - structure, argumentation, and linguistic means; meta-subject potential - MM-1 (the construction of a logical chain) and MM-6 (taking the opponent's position into account); methodology - a process approach: from thesis through arguments to conclusion, with reflection on each stage. Or the topic "Analysis of a Poetic Text": subject content - means of expressiveness and poetic meter; meta-subject potential - MM-3 (emotional intelligence, the recognition of emotions) and MM-10 (spatial imagination, the visualization of images); methodology - not a formal analysis of tropes, but an "entering" into the emotional world of the poem.

For the mathematics faculty. The topic "Proof of a Theorem": subject content - the logical structure of a proof; meta-subject potential - MM-1 (the building of a logical chain) and MM-6 (the checking of each step); methodology - not the memorization of a ready-made proof, but its independent construction with reflection on each step. Or the topic "Solving Problems with a Parameter": subject content - the investigation of the dependence of roots on the parameter; meta-subject potential - MM-11 (forecasting, the foreseeing of results) and MM-6 (the analysis of different cases);

methodology - an inquiry approach: "What will happen if the parameter is changed?". Or the topic "Stereometry (Sections)": subject content - the construction of sections of polyhedra; meta-subject potential - MM-10 (spatial imagination, visualization) and MM-11 (forecasting the result of a construction); methodology - mental rotation, preliminary forecasting, and verification.

For the history faculty. The topic "Causes of a Historical Event": subject content - factors, chronology, and consequences; meta-subject potential - MM-1 (the identification of multiple causes) and MM-6 (the evaluation of sources); methodology - the analysis of different interpretations, work with primary sources, and debates. Or the topic "Historical Interpretation": subject content - different points of view on an event; meta-subject potential - MM-6 (the evaluation of bias) and MM-5 (Socratic dialogue, the maintenance of tension between perspectives); methodology - not the "single correct" version, but comparison and evaluation. Or the topic "Analysis of the Decisions of Historical Figures": subject content - strategies, alternatives, and consequences; meta-subject potential - MM-11 (the analysis of alternatives) and MM-1 (the understanding of the connection between decisions and consequences); methodology - role-playing games, simulations, and the analysis of "what would have happened if...".

It is precisely such an approach - from subject content to meta-subject potential through the methodology of actualization - that must become the basis of the design of subject preparation. It is like an architect designing a building: he does not simply choose materials (subject content), but also thinks through how these materials will work together, what functions they will perform, and how the space for living will be organized. The teacher-architect designs the lesson in the same way: he does not simply select content, but also thinks through which mechanisms of thinking will be engaged and how to organize the students' activity so that these mechanisms are actualized and developed.

Principles of the Restructuring of Subject Methodologies

How then must the methodology of teaching concrete disciplines in the pedagogical university change? I distinguish five key shifts. The first is from "explain - show - check" to "create the conditions for discovery." Traditional methodology is built on the principle "explain - show - check." The teacher explains the topic, shows examples, and checks assimilation. In the new methodology the accent shifts: the teacher creates conditions in which the students themselves arrive at understanding through thinking. What does this mean for the preparation of the teacher? The student must master not only "how to explain a theorem," but also "how to organize an inquiry in which the students themselves will discover this theorem." Not "how to tell about the causes of a war," but "how to organize work with sources in which the students themselves will identify these causes." This is precisely how the transition from the transmission of knowledge to facilitation manifests itself, about which I spoke in article 1 [1].

The second shift is from "the drilling of skills" to "the solving of tasks requiring thinking." Traditional methodology places the accent on the drilling of skills - the solving of same-type tasks and the performance of exercises according to a model. In the new methodology the accent shifts to tasks that require thinking - not an algorithm, but analysis, the choice of a strategy, and forecasting. What does this mean for the preparation of the teacher? The student must be able to distinguish tasks that train algorithms from tasks that develop thinking. He must be able to create (or select) tasks of the second type and to understand which particular mechanism (especially from the core) they develop.

The third shift is from "frontal work" to "dialogue and collaboration." Traditional methodology is oriented toward frontal work - the teacher speaks, the students listen. In the new methodology the accent shifts to dialogue, discussion, group work, and debates. This is directly connected with the development of MM-5 (Socratic dialogue) - one of the key mechanisms of the core. What does this mean for the preparation of the teacher? The student must master the technologies of organizing dialogue, debates, and group work. He must be able to create situations in which the students speak - not only answer questions, but also ask them, argue, adduce arguments, and listen.

The fourth shift is from "the assessment of the result" to "the diagnostics of the process." Traditional methodology is oriented toward the assessment of the result - a right or wrong answer. In the new methodology the accent shifts to the diagnostics of the process - how the student arrived at the answer, what strategies he used, and where he stumbled. What does this mean for the preparation of the teacher? The student must master the instruments of the diagnostics of mental mechanisms (see article 3 [3]). He must be able to "read" the process of the student's thinking from his answers, questions, and reasoning.

The fifth shift is from the "isolated subject" to "interdisciplinary connections." Traditional methodology regards the subject as an isolated discipline. In the new methodology the accent shifts to interdisciplinary connections - the understanding of how one and the same mental mechanism is developed through different subjects. This is one more step toward the creation of that very "rich cognitive niche" (Issue 3, Art. 13) in which the student sees the world holistically. What does this mean for the preparation of the teacher? The student must understand how his subject is connected with other subjects in the development of mental mechanisms. Researchers emphasize the importance of "interdisciplinary project-oriented learning, collaborative tasks and the use of educational technologies" [8]. It is precisely such an approach that allows one to see the subject not as an isolated domain, but as part of a unified system for the development of thinking.

Examples of Restructuring for Different Faculties

Now I will show how these principles work for different faculties. At the philology faculty the traditional logic is to study the rules, perform exercises, and write a dictation. The new logic: every grammatical rule is an instrument for understanding meaning. Every exercise is a diagnostics of thinking. Every text is material for the development of critical thinking and emotional intelligence. What changes? The course "Contemporary Russian Language" includes not only the systematization of parts of speech and members of the sentence, but also an analysis of how linguistic means work in different types of text to achieve different goals (to persuade, to describe, to narrate, to make one think). The course "Methodology of Teaching the Russian Language" includes not only "how to explain the rules," but also "which mental mechanisms are developed through work with a text" and "how to diagnose this development." The course "Rhetoric" becomes not an elective, but an obligatory part of the preparation - the development of MM-2 (eloquence), MM-5 (Socratic dialogue), and MM-7 (constructive argument).

At the mathematics faculty the traditional logic is to study formulas, solve tasks according to a model, and pass a test. The new logic: every formula is an instrument for understanding structure. Every task is a challenge for logical thinking. Every proof is a training of cause-and-effect relationships (MM-1). What changes? The course "Mathematical Analysis" includes not only computations, but also an analysis of how mathematical methods allow one to model real processes and to forecast their development (MM-11). The course "Geometry" places the accent on spatial imagination (MM-10) - not only the solving of tasks on a drawing, but also mental rotation, visualization, and the creation of 3D models. The course "Methodology of Teaching Mathematics" includes "which mental mechanisms are developed through the solving of different types of tasks" and "how to diagnose the level of logical thinking."

At the natural science faculty the traditional logic is to study laws, memorize formulas, and solve tasks. The new logic: every law is a description of a cause-and-effect connection. Every experiment is a testing of a hypothesis. Every formula is an instrument of forecasting. What changes? The course "Physics" places the accent on the experimental method (MM-6), forecasting (MM-11) and cause-and-effect connections (MM-1) - not only "to know Ohm's law," but also "to plan an experiment for its verification" and "to explain why it works." The course "Chemistry" places the accent on systems thinking (MM-1) and spatial imagination (MM-10) - not only "to know formulas," but also "to see molecules in 3D" and "to understand how a system reacts to changes." The course "Biology" places the accent on evolutionary logic (MM-1) and forecasting (MM-11) - not only "to know the classification," but also "to understand how systems evolve" and "to forecast the consequences of changes."

At the history faculty the traditional logic is to memorize dates, names, and the sequence of events. The new logic: every event is a point of intersection of a multitude of causes. Every interpretation is a choice. Every decision is a strategy. What changes? The course "History of Russia" includes not only chronology, but also work with different interpretations, the analysis of sources, and debates about contentious questions (MM-5, MM-6, MM-7). The course "Methodology of Teaching History" includes "how to organize work with sources," "how to conduct historical debates," and "how to develop strategic thinking through the analysis of historical decisions" (MM-11).

Inter-Faculty Modules as a Space of Integration

I have already spoken of inter-faculty modules in article 2 [2]. Here I want to emphasize their role precisely in subject preparation. Inter-faculty modules are not an "addition" to subject preparation, but a space where subject specificity meets the common meta-subject framework. What are these modules? "Logic and Critical Thinking" - common to all faculties. The philology students see how logic works in the analysis of a text. The mathematics students - how

logic works in the proof of theorems. The history students - how logic works in the analysis of the causes of events. "Rhetoric and Communication" - common to all. Students of all specialties learn to express their thoughts clearly and persuasively, to conduct a dialogue, and to argue constructively. "Psychology of the Development of Thinking" - common to all. Students understand how mental mechanisms are formed in ontogenesis and how to diagnose and develop them. "Project Activity" - common to all. Students of different faculties work on interdisciplinary projects where subject knowledge is applied to the solution of real problems.

Researchers note that "meta-subject practice in the school of future teachers" must be built on a "value-semantic basis" [8]. Inter-faculty modules create this basis - they show that the development of thinking is not an "additional" task, but the meaning of all pedagogical activity. It is like the general course of philosophy that exists at the university for all specialties: it does not replace subject preparation, but gives the common framework in which subject knowledge acquires meaning.

The Role of Practice in the New Subject Preparation

Subject preparation cannot be only classroom-based. It must include practice in which the student applies the principle of the "dual purpose of a topic" in real conditions. What is this practice? The analysis of lessons - the student watches video recordings of lessons and analyzes which mental mechanisms are developed (or not developed) in this lesson. The design of lessons - the student develops lessons with a dual purpose, fixing not only the subject content, but also the mechanisms being developed. The conduct of lessons - the student conducts lessons in the school (or in the training classroom) and receives feedback on how successfully he realized the principle of dual purpose. The reflection on practice - the student analyzes his practice, records what worked, what did not work, and what needs to be changed.

A 2025 study emphasizes that "instructional practice" is a "means of forming the meta-subject competence of future teachers." The authors of the study developed and tested an "instructional (technological in pedagogy) practice for the preparation of a future teacher possessing meta-subject competence." The results showed that "the implementation of the content of the practice allowed third-year students to actualize their own experience and to master innovative forms and methods of instruction directed toward the formation and achievement of their own meta-subject competence" [7]. It is precisely such practice - not "observation," but "lived experience" of the new pedagogical reality - that must become the basis of subject preparation. It is like the difference between studying swimming from a textbook and a real immersion in the water: only in practice does the student truly master the new way of thinking and activity.

What the Graduate Must Know and Be Able to Do: The Subject Aspect

I conclude this article with a concrete answer to the question: what must the graduate of the pedagogical university know and be able to do in the subject aspect? He must know the content of his subject at a level sufficient to see its meta-subject potential; which mental mechanisms (especially from the core) are developed through his subject as a whole and through each topic separately; how to diagnose the level of development of these mechanisms in students; how to design lessons with a dual purpose. He must be able to analyze any topic of his subject from the point of view of its meta-subject potential; to design lessons that simultaneously solve subject and meta-subject tasks; to select and create tasks that develop concrete mental mechanisms; to diagnose progress in the development of thinking in students; to reflect on his own practice and to correct it on the basis of diagnostic data; to see the connections of his subject with other subjects in the development of mental mechanisms. Researchers emphasize: "it is necessary to increase the number of hours for the disciplines of professional preparation in the organization of pedagogical practice" [10]. But the point is not only in the number of hours - the point is in the quality of the practice, in its orientation toward the development of meta-subject competence.

Conclusion: The Subject as a Means, and Not a Goal

I want to end this article by returning to its title. Subject preparation in a new way is the transition from the "knowledge of the subject" to the "subject as a means." This does not mean that subject knowledge becomes less important. On the contrary, it becomes more important - because only a deep knowledge of the subject allows one to see its meta-subject potential. A teacher who knows mathematics superficially will not be able to see how the Pythagorean theorem develops logical thinking. A teacher who knows history superficially will not be able to organize work with different interpretations. But subject knowledge ceases to be an end in itself. It becomes an

instrument. An instrument for the development of thinking. An instrument for the formation of the personality. An instrument through which the student learns to think, to understand, to forecast, to critically evaluate, and to conduct a dialogue. As John Dewey wrote, subject content is "the most important intellectual resource for developmental instruction" [9]. But this resource becomes accessible only when the teacher sees in the subject not a corpus of knowledge, but the living fabric of thinking.

It is precisely such subject preparation that I propose. Not "a teacher who knows his subject." But an "architect of thinking" for whom the subject is the material, and thinking is the building that he helps to construct for each student. It is precisely in this that the essence of overcoming epistemological recursion (Issue 3, Art. 1) consists: a teacher prepared in a new way himself becomes a subject capable of re-comprehension, and forms the same subject in the student. In the next article I will show how the psychological-pedagogical block of the teacher's preparation must be restructured - from theory to the practice of facilitation.

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