# Mental Mechanisms as the Mainstay of a Teacher’s Professional Competence

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**Fractal Academy**
Issue 6 (Autumn 2026), Article 2
Series: "Pedagogical Education in the CCFP Model: From Subject-Centrism to the Development of Thinking"
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DOI: [to be assigned]
Publication date: 1.11.2026

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*Title (English):* «Mental Mechanisms as the Mainstay of a Teacher’s Professional Competence»
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## Annotation

In this article I show that the eleven mental mechanisms of the CCFP model must become not simply an "additional topic" in the curriculum of the pedagogical university, but the core of the teacher's professional competence. Drawing on the CCFP model presented in previous articles of the issue, on current research of 2024-2026 in the field of pedagogical education, and on an analysis of international standards of teacher preparation, I substantiate that the future teacher must not simply know the list of eleven mechanisms, but see their manifestations in his subject, in the behavior of students and in his own thought processes. I pay special attention to the "core/support" hierarchy: without mastering the mechanisms of the core, the teacher will not be able to become an "architect of thinking." I offer a detailed analysis of each mechanism - not as an abstract concept, but as a working instrument of the teacher. I pay special attention to how each mechanism "sounds" in different subjects, and I show that the preparation of the "architect of thinking" begins with the diagnostics of mental mechanisms in the students themselves. I also substantiate that without mastering this toolkit the teacher will not be able to implement the principle of the dual purpose of the lesson and will remain a "subject specialist" in the old sense of the word.

Keywords: mental mechanisms, CCFP, core and support, professional competence of the teacher, diagnostics, reflection, architect of thinking, pedagogical education.

## Introduction: Why the Teacher Must Know the Mental Mechanisms

In the first article of this series I substantiated that the pedagogical university must prepare not a "subject specialist," but an "architect of thinking" [4]. Now I must answer the question: what exactly must this "architect" know and be able to do? My answer is brief: he must know and be able to work with the eleven mental mechanisms. Not as with an abstract list from a methodological manual, but as with living instruments of pedagogical practice. It is like the difference between a person who has learned the names of musical instruments from pictures, and a conductor who hears how each of them sounds in the orchestra. The subject-specialist teacher knows his subject, but does not hear how the mechanisms of thinking sound in it. The teacher-architect hears this symphony and knows how to tune it.

Research confirms: teachers play a "vitally important role as guides and facilitators of dialogue in order to strengthen the processes of students' critical thinking" [6]. However, as a 2025 study notes, "teachers appear to be relatively poorly prepared to teach critical thinking, having both theoretical and methodological needs" [5]. It is precisely this gap - between the requirement to develop thinking and the unpreparedness of teachers to do so - that I propose to overcome through the systemic mastery of mental mechanisms. Critical thinking, as researchers emphasize, "is a fundamental cognitive skill that allows people to think systematically, analytically and logically" [5]. It "allows people to approach information with an inquiring mind and to analyze and evaluate data objectively" [5]. But in order to develop this thinking in students, the teacher must himself possess it - and, moreover, possess the methodology of its development through his subject. As research shows, "the dispositional aspects of psychological literacy, especially critical thinking, may be more strongly connected with teachers' professional self-perceptions than knowledge alone" [7]. This means that what is at issue is not the memorization of definitions, but the formation of a particular cast of mind, a particular professional position. That is precisely why I insist: mental mechanisms must become the core of the teacher's professional competence. Not "one of the topics," but that which permeates everything - from goal-setting to the evaluation of results. As the circulatory system permeates every organ, so the knowledge of the mechanisms must permeate every lesson, every task, and every feedback.

## What Mental Mechanisms Are: Not a List, but a Toolkit

Before turning to the detailed analysis, I must make an important clarification. The eleven mental mechanisms described in article 5 of Issue 1 [1] are not simply "skills" or "competencies." They are fundamental cognitive operations that lie at the basis of any thinking, any activity, any communication. It is critically important to understand that these eleven mechanisms are not equal to one another. In my model they are divided into two levels: core and support (substantiated in detail in Issue 1, Art. 5 and Issue 3, Art. 1). The core is six mechanisms that directly constitute the act of solving complex problems. Without them thinking is logically incomplete. Support is five mechanisms without which the core does not work in practice, but which in themselves do not create the solution.

Here is the full list. Core: the construction of cause-and-effect relationships (MM-1) - the ability to see how one phenomenon follows from another and to build logical chains; emotional intelligence (MM-3) - the ability to recognize, understand and manage one's own emotions and the emotions of others; Socratic dialogue (MM-5) - the ability to ask questions that deepen understanding and to maintain tension between perspectives; critical thinking (MM-6) - the ability to evaluate information, to find errors, to distinguish facts from interpretations, and to deconstruct axioms; spatial imagination and 3D visualization (MM-10) - the ability to create and operate with mental images and to retain multidimensional models; forecasting and strategic thinking (MM-11) - the ability to foresee results and to plan strategies. Support: eloquence and conciseness (MM-2) - the ability to express one's thoughts clearly, precisely and persuasively; long-term memory and mnemonics (MM-4) - the ability to retain and structure information; constructive argument (MM-7) - the ability to argue, to listen, and not to resort to personal attacks; non-verbal communication and charisma (MM-8) - the ability to use and understand body language, intonation, and facial expressions; information search and analysis (MM-9) - the ability to find, structure and interpret data.

These eleven mechanisms are not isolated "abilities." They are interconnected, complement each other, and in their aggregate form what I call the cognitive apparatus of the personality. For the teacher the knowledge of these mechanisms is not a theoretical luxury. It is a practical necessity. Because without knowledge of MM-1 the teacher will not be able to teach students to see the logic of the subject. Without knowledge of MM-2 he will not be able to teach them to express thoughts clearly. Without knowledge of MM-3 he will not be able to create an emotionally safe environment. Without knowledge of MM-6 he will not be able to teach them to critically evaluate information. And so on - for each mechanism. But priority in the preparation of the teacher must be given to the core. A teacher who does not master the mechanisms of the core will not be able to become an "architect of thinking," even if he knows his subject to perfection. As a 2025 study notes, "the ability to integrate technological, pedagogical and subject knowledge (TPACK), as well as to design instruction conducive to the development of critical thinking, is a most important competence for future teachers" [9]. I add to this: the ability to integrate knowledge about mental mechanisms, above all those of the core, into every lesson.

## How Each Mechanism Manifests in the Subject: From Abstraction to the Concrete

Now I will turn to the most important thing. The future teacher must not simply know the list of eleven mechanisms - he must see their manifestations in his subject. I will show this with examples for different faculties, placing the accent on the mechanisms of the core. For philologists: MM-1 manifests in the analysis of why the author uses precisely these words, how one sentence follows from another, and how the logic of a literary text is built. MM-2 - in the ability to build a coherent utterance, to select precise words, and to adapt speech for different audiences. MM-3 - in the ability to recognize the emotions of characters, to understand the emotional coloring of words, and to express one's feelings. MM-6 - in the ability to distinguish facts from opinions, to evaluate the reliability of sources, and to identify hidden assumptions. MM-5 - in the art of asking questions about a text, about the author, and about oneself. MM-7 - in the ability to argue one's interpretation and to hear another's.

For mathematicians: MM-1 - in the construction of logical chains from the condition to the answer, in the proof of theorems. MM-6 - in the checking of solutions, the search for counterexamples, and the evaluation of the sufficiency of a proof. MM-10 - in the mental rotation of figures, the visualization of sections, and work with 3D models. For natural scientists: MM-1 - in the understanding of physical laws, chemical reactions, and ecological chains. MM-6 - in the planning of an experiment, the evaluation of the reliability of data, and the interpretation of results. MM-9 - in work with scientific sources and the analysis of experimental data. MM-10 - in the visualization of molecular structures, physical fields, and biological systems. MM-11 - in the foreseeing of the results of experiments and the forecasting of changes in systems. For historians and social scientists: MM-1 - in the analysis of the causes of

historical events, geographical processes, and social phenomena. MM-6 - in the evaluation of the reliability of sources, the comparison of interpretations, and the identification of bias. MM-7 - in historical debates and the discussion of different interpretations. MM-10 - in work with maps and the visualization of spatial patterns. MM-11 - in the analysis of strategic decisions and the forecasting of consequences.

Some mechanisms are "cross-cutting" for all subjects. MM-4 is required in all subjects, but especially in a foreign language, history, and mathematics. MM-8 is developed through physical education, art, and a foreign language, but also through public speeches in any subject. MM-2 is developed through all subjects where there are oral and written utterances. Research shows that "teacher education curricula should give paramount attention to the development of such crucial competencies as creativity, critical thinking, collaboration, empathy and digital literacy" [8]. The CCFP model gives precisely such a system - but not as a set of "soft skills," but as a cognitive framework in which each mechanism has its place and its function. It is like the old anecdote about the centipede that thought about how it walks and unlearned how to walk. A teacher who is not aware of the mechanisms works intuitively. A teacher who is aware of them can manage this process - not losing lightness, but acquiring precision.

**From Knowledge to Action: How Mechanisms Become Instruments**

To know how mechanisms manifest in the subject is half the job. The other half is to be able to use this knowledge in pedagogical practice. Researchers distinguish six indicators of critical thinking that can serve as a guide for the teacher: "interpretation, analysis, evaluation, inference, explanation and self-regulation" [10]. These indicators are not simply "theoretical constructions." They are concrete actions that the teacher can observe in students and form in them. What does this mean in practice? Interpretation - the ability to understand the meaning of information and to single out the main thing. The teacher can develop this through tasks: "Explain in your own words," "What is the main thing here?", "How is this connected with what we already know?". Analysis - the ability to break the whole into parts and to see the structure. Tasks: "Of which parts does this text, task or process consist?", "How are they connected?". Evaluation - the ability to determine reliability, significance and trustworthiness. Tasks: "Can this source be trusted?", "How convincing are these arguments?". Inference - the ability to draw conclusions on the basis of the available information. Tasks: "What follows from this?", "What conclusion can be drawn?". Explanation - the ability to set out one's thoughts clearly and persuasively. Tasks: "Explain your solution," "Why do you think so?". Self-regulation - the ability to control one's own process of thinking. Tasks: "How did you arrive at this answer?", "What would you do differently?", "Which errors did you notice?".

As a 2025 study notes, "teacher preparation programs should include interdisciplinary project-oriented learning, collaborative tasks and the use of educational technologies" [8]. But the key is that these methods should be consciously directed toward the development of concrete mental mechanisms. The study also shows that "teaching practices based on socioscientific scenarios significantly improved the critical thinking skills of future teachers" [6]. This means that even in the preparation of the teachers themselves the same mechanisms work: in order to teach critical thinking, one must create a situation requiring critical thinking. One cannot teach swimming on dry land - water is needed. One cannot teach thinking without creating a situation of thought.

**Diagnostics as the Teacher's First Competence**

I have already spoken of this in article 6 of Issue 1 [2], but here I must repeat it with special emphasis: without diagnostics the management of development is impossible. A teacher who does not know how to diagnose the level of development of mental mechanisms in students works blindly. He does not know from which level to begin, does not see progress, and cannot correct his strategy. What must the teacher be able to diagnose? The level of MM-1 - how long and logical the chains the student can build. The level of MM-2 - how clearly and precisely he expresses his thoughts. The level of MM-3 - how precisely he recognizes and names emotions. The level of MM-6 - how critically he evaluates information. And so on - for each mechanism. The diagnostic instruments that the future teacher must master: observation - the ability to record the manifestations of mechanisms in the behavior and speech of students; analysis of activity products - essays, solutions of tasks, projects, and drawings; reflective conversations - the ability to ask questions that reveal the level of thinking; portfolio - the ability to collect and analyze the dynamics of development; diagnostic tasks - the ability to create tasks that reveal the level of concrete mechanisms.

As a 2025 study shows, "reflective self-assessment and collaborative project work" are key elements of the development of critical thinking [8]. This applies not only to students, but also to the future teachers themselves.

Diagnostics is not a test at the end of the year. It is a constant process embedded in the very fabric of instruction. As a doctor cannot treat without making a diagnosis, so a teacher cannot develop without seeing where the student is.

**The Student's Personal Reflection: Where Preparation Begins**

I want to emphasize one fundamental point. The preparation of the "architect of thinking" begins not with theory, but with the diagnostics of the student's own mental mechanisms. Research confirms: "the dispositional aspects of psychological literacy, especially critical thinking, may be more strongly connected with teachers' professional self-perceptions than knowledge alone" [7]. This means that one cannot teach what is not in oneself. What does this mean in practice? The philology student must not simply study the theory of eloquence (MM-2) - he must practice it: speak, write, and analyze his speech. The mathematics student must not simply know what critical thinking is (MM-6) - he must diagnose it in himself: how he checks solutions, how he finds errors, how he evaluates proofs. The history student must not simply understand what the multiplicity of interpretations is - he must reflect on his own ability to see different points of view. The instruments of personal reflection: a self-observation diary - records of how mechanisms manifest in one's own thought activity; reflective essays - an analysis of one's own thinking, one's strengths and weaknesses; diagnostic tests - an assessment of the level of development of each mechanism; feedback from instructors and fellow students - an external evaluation of the manifestations of mechanisms; a portfolio of personal development - the trajectory of growth in each mechanism.

As a study notes, "the formation of the components of critical thinking requires elements of value stimulation, a critical attitude to information, a thirst for the cognition of truth and research interest; reflective abilities" [5]. All of this must be formed in the student of the pedagogical university himself - before he begins to form it in schoolchildren. It is like the well-known parable that one cannot fill a cup that is already full. A student who does not reflect on his own thinking will not be able to teach another to reflect.

**Inter-Faculty Modules: A Common Logic for All**

One of the key challenges in the preparation of "architects of thinking" is how to organize the instruction of students of different faculties so that they master the common toolkit without losing subject specificity. My answer: inter-faculty modules that all students pass regardless of their specialty. These modules are the designing of that very "rich cognitive niche" for future teachers (Issue 3, Art. 13), in which they do not simply receive information, but live through and master the mechanisms. What are these modules? "Mental Mechanisms: Theory and Diagnostics" - a general introduction to the CCFP model, a detailed analysis of each mechanism with priority given to the core, and methods of diagnostics. "Logic and Critical Thinking" - the development of MM-1, MM-6, and MM-11 through special exercises and tasks. "Rhetoric and Communication" - the development of MM-2, MM-5, MM-7, and MM-8 through public speeches, debates, and dialogues. "Psychology of the Development of Thinking" - the development of MM-3 and an understanding of how cognitive abilities are formed in ontogenesis. "Project Activity" - the integration of all mechanisms through practical project work.

Research confirms the importance of such an approach. "Teacher preparation programs should give paramount attention to the development of such crucial competencies as creativity, critical thinking, collaboration, empathy and digital literacy" [8]. Inter-faculty modules allow these competencies to be developed in a common environment where students of different specialties learn from each other and see how the same mechanisms work in different subject contexts. The study also shows that "the successful development of critical and creative thinking abilities requires a balanced approach combining structured support systems, innovative pedagogical strategies and technological infrastructure" [5]. Inter-faculty modules are precisely that "structured system of support" which creates a common framework for the entire preparation.

**Levels of Development of Mechanisms: From the Intuitive to the Conscious**

I must add one more important element. Mental mechanisms develop nonlinearly. Each mechanism has levels - from intuitive, unconscious use to masterly, reflective mastery. For the teacher it is important to understand these levels. Level 0, absence - the mechanism does not manifest, and the student is unable to perform the corresponding operations. Level 1, intuitive - the mechanism manifests spontaneously, but unconsciously. The student can build a cause-and-effect chain, but cannot explain how he did it. Level 2, conscious - the student understands what he is doing, can explain his thought operations, but is not yet always able to control them. Level 3, reflective - the student

not only performs operations, but also reflects on them, can correct them and choose different strategies. Level 4, masterly - the mechanism becomes a "second nature," used flexibly and creatively in different contexts.

What does this give the teacher? An understanding of levels allows one to diagnose - to determine at which level each student is for each mechanism; to set goals - to know toward which level one must move; to choose methods - to understand which tasks and strategies work for each level; to evaluate progress - to see movement from level to level. As a 2025 study notes, "critical thinking is fundamental to the academic success of students and helps prepare them for solving real problems" [5]. But in order to develop it, the teacher must see where the student is now and where he must move. It is like navigation: in order to lay out a route, one must know where one is. Without diagnostics the teacher works like a GPS without a signal - it seems to move, but where?

**Conclusion: Mechanisms as the Core, and Not an Addition**

I want to end this article with what I began with. Mental mechanisms are not an "additional topic" in the curriculum of the pedagogical university. They are the core of the teacher's professional competence. Without knowledge of these mechanisms the teacher remains a "subject specialist" in the old sense of the word - a transmitter of knowledge who does not see how his subject develops thinking. With knowledge of these mechanisms the teacher becomes an "architect of thinking" - a professional who consciously designs every lesson so that it simultaneously solves two tasks: the subject task and the meta-subject task. Research confirms: "today the teaching profession requires not only pedagogical expertise, but also the ability to interpret and apply psychological knowledge in the context of the classroom" [7]. The CCFP model gives precisely such an opportunity - to interpret and apply knowledge about thinking in every lesson, in every subject.

What must the student take away from this module? Knowledge - he must know all eleven mechanisms, their manifestations, levels of development, and clearly understand the difference between core and support. Diagnostics - he must be able to diagnose the level of each mechanism in himself and in students, with priority given to the core. Design - he must be able to design lessons so that they develop concrete mechanisms. Reflection - he must be able to reflect on his own practice and his own thinking. Integration - he must see how the mechanisms work in his subject and how they are connected with other subjects.

Researchers emphasize: "in teacher education programs critical thinking must be systematically integrated" [8]. I add: not only critical thinking, but all eleven mechanisms. And not "integrated" as an addition, but to become the core around which everything else is built. It is precisely such preparation that forms not a "subject specialist who also knows about mechanisms," but an "architect of thinking" for whom mechanisms are the main instrument of professional activity. And this, in turn, is a necessary condition for overcoming epistemological recursion and for the evolution of the cognitive potential of the species (Issue 3, Art. 1). In the next article I will show how exactly diagnostics must be organized in the hands of the teacher - how to see the invisible and measure the unmeasurable.

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**Conflict of Interest**
The author declares no conflict of interest related to the publication of this article.

**Funding**
The research was conducted without external funding.

**Data Availability Statement**
The data discussed in the article are contained in the text of the publication. Additional materials can be requested from the author.

**Author Contributions**
Aleksandr Kleymenov - concept, research, text writing, final editing.

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