# Extracurricular Activity as a Space for the Development of Mental Mechanisms

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## Annotation

In this article, I show how extracurricular activity becomes not an "additional" element of school life, but a necessary space for the development of mental mechanisms. Drawing on the CCFP model presented in previous articles of the module [1], [5], and on current research of 2023-2025, I substantiate that extracurricular activity possesses a unique potential for the development of all eleven mental mechanisms - precisely because it is free from the rigid framework of the lesson, curricular restrictions and formal assessment. I propose a systematic overview of the types of extracurricular activity (clubs, sections, societies, studios, projects, competitions, camps) and show how each of them can serve the development of specific mechanisms. I pay special attention to the fact that extracurricular activity is a "point of entry" for identifying a child's unique abilities - it is precisely there, and not in the lesson, that many children first discover their talents [2]. I also substantiate that extracurricular activity is not a "workload" on teachers and not an "entertainment" for children, but a strategic resource for the development of thinking, which requires thoughtful design, support and infrastructure [4].

Keywords: extracurricular activity, mental mechanisms, clubs, societies, studios, project activity, competitions, individual trajectory, infrastructure, diagnostics.

## Introduction: Why Extracurricular Activity Is Not "Additional" but "Fundamental"

Over the fifteen articles of this series, I have consistently shown how each school subject can become an instrument for the development of mental mechanisms. I have also substantiated the necessity of introducing new subjects - logic, rhetoric, psychology, project activity [8]. But I must ask the question that inevitably arises: is even the most thoughtful lesson sufficient for the full development of all mental mechanisms? My answer is no. A lesson, even the best one, remains a lesson. It has time limits, curricular restrictions, an assessment system, and is compulsory for all. Extracurricular activity is a different space. It is voluntary, flexible, free from formal assessment, and oriented toward interest and enthusiasm. And it is precisely in this space, as practice and research show, that enormous potential for the development of thinking is revealed.

Research confirms: "participation in after-school programs has a positive influence on the cognitive and non-cognitive development of students" [10]. A meta-analysis of 37 studies showed that after-school programs have "moderately positive effects on academic achievement (d = 0.369) and social-emotional competence (d = 0.220)" [10]. The experience with debate as an extracurricular activity is especially instructive. A study in Boston schools showed that participation in debate - "an extracurricular activity aimed at developing critical thinking, argumentation and policy analysis skills in middle and high school students" - led to "a positive effect on English language test results of 0.13 standard deviations, equivalent to 68% of a full year of learning in the ninth grade" [11]. Moreover, "the gains were concentrated in analytical rather than mechanical skills" [11]. And what is especially important - "the effect was greatest among students with the lowest achievement prior to participating in debate" [11]. A study of the hackathon as an extracurricular format showed that it "effectively develops creativity, critical thinking, communication, collaboration, information literacy and life skills" in fifth-graders [13].

But I want to go further and show how extracurricular activity becomes not simply a "useful supplement" to lessons, but a necessary space for the development of the CCFP. It is precisely in extracurricular activity that a child can find his "point of entry" - that unique ability which becomes the key to the development of all the other mental mechanisms

[1]. It is precisely in extracurricular activity that motivation is formed, without which sustainable development is impossible. It is precisely in extracurricular activity that what is impossible in a lesson occurs - free choice, voluntary effort, enthusiasm, creativity. It is important to emphasize: extracurricular activity creates the conditions of possibility for the development of mental mechanisms, but is not their sufficient cause. In itself, attending a club or section does not guarantee the development of thinking. Development occurs only through specially organized pedagogical activity, where the teacher of supplementary education acts as a facilitator and architect of the cognitive apparatus [1]. Moreover, the restructuring of the attitude toward extracurricular activity is not merely a methodological question. It is part of that historical necessity of changing the pedagogical paradigm about which I wrote in articles [3] and [4]. The industrial school regarded extracurricular activity as a "supplement" to lessons, as a "workload" or "entertainment." But post-industrial society needs people capable of thinking, creating, adapting - and extracurricular activity here is a key instrument. As I showed in article [2], subject-centrism is one of the main reasons for the vitality of the old model. Overcoming this subject-centrism begins with a rethinking of the role of extracurricular activity in education.

**How Extracurricular Activity Differs from a Lesson**

Before turning to a systematic overview of the types of extracurricular activity, I want to clearly formulate how this space differs fundamentally from a lesson. First, voluntariness. A child comes to an extracurricular class not because he "has to," but because it is "interesting." This changes everything: motivation becomes internal rather than external. Research confirms that "voluntary participation in extracurricular activity" is a key factor in the development of "communication skills, responsibility and self-esteem" [15]. Second, the absence of formal assessment. In extracurricular activity there are no grades, no Unified State Exam, no tests. This removes the fear of error and creates a space for experiments, trials, and creativity. As research shows, "the absence of formal assessment" allows participants "to develop problem-solving skills and critical thinking" in a safe environment [16]. Third, flexibility of content and forms. Extracurricular activity is not limited by the curriculum. It can change depending on the interests of the children, the questions that arise, and current events. This allows it to be responsive to real developmental needs. Fourth, interdisciplinarity. Extracurricular activity naturally goes beyond the boundaries of subjects. A robotics club combines physics, mathematics, informatics, and engineering. A theater studio - literature, rhetoric, psychology, and non-verbal communication. This creates the conditions for integrative thinking. Fifth, duration and depth. Extracurricular classes can last longer than a lesson, can continue for years, and can include field trips, camps, and competitions. This allows one to immerse oneself in an activity deeply, and not superficially. Sixth, mixed-age composition. Unlike a class, where everyone is the same age, extracurricular associations often include children of different ages. This creates natural conditions for mentoring, cooperation, and the transmission of experience - that which was characteristic of the evolutionary environment of adaptation about which I wrote in the second article [3]. It is precisely these differences that make extracurricular activity a unique space for the development of mental mechanisms - a space that cannot be replaced by any, even the best, lesson.

**Clubs, Studios, Sections: How Different Forms of Extracurricular Activity Develop Thinking**

I propose a systematic overview of the main types of extracurricular activity and show how each of them can serve the development of specific mental mechanisms. In the CCFP model, all mechanisms are divided into the core (MM-1, MM-3, MM-5, MM-6, MM-10, MM-11) and the supporting level (MM-2, MM-4, MM-7, MM-8, MM-9). Extracurricular activity is unique in that it allows the development of both the core and the supporting level in natural, free conditions, but priority in pedagogical work should be given to the core [1]. Clubs and societies of interest are the most widespread form. A club is a community united by a common interest: a mathematics club, a literature society, a history club, a chess club, a robotics club, an ecology club. Here the following are developed: cause-and-effect relationships (MM-1) - through solving non-standard tasks, analyzing the causes of events, and understanding connections in nature; critical thinking (MM-6) - through analyzing texts, working with sources, and evaluating a position; Socratic dialogue (MM-5) and constructive argument (MM-7) - through discussion, debate, and joint search for a solution; forecasting and strategic thinking (MM-11) - through calculating options and planning; long-term memory (MM-4) - through memorizing large volumes of information. Research confirms that "clubs of interest" are an effective form for developing "soft skills," including "critical thinking, creativity, teamwork, communication skills, and conflict resolution skills" [15].

Studios - art, music, theater, dance - are spaces for creative self-expression. Unlike clubs, which may be more "intellectual," studios are oriented toward practical creation. Here the following are developed: emotional intelligence (MM-3) - through the expression and recognition of emotions in creativity; spatial imagination (MM-10) - through work with composition, color, and movement in space; non-verbal communication and charisma (MM-8) - through bodily expressiveness, voice, and intonation; long-term memory (MM-4) - through memorizing works and roles; eloquence (MM-2) - through work on the text of a role, articulation, and diction. Research shows that "art-based methods support the development of emotional intelligence, creativity and critical thinking" [6].

Sports sections are a space for the development of the body, but also for the development of thinking, especially strategic, spatial and emotional. Here the following are developed: forecasting and strategic thinking (MM-11) - through forecasting the actions of opponents and planning strategy; spatial imagination (MM-10) - through orientation on the field and estimation of distances and trajectories; non-verbal communication (MM-8) - through body language, gestures, and facial expressions; emotional intelligence (MM-3) - through managing emotions in competitive situations; constructive argument (MM-7) - through discussing strategy and making collective decisions. As I showed in article 13 [7], physical education is the school of embodied intelligence, and sports sections provide an opportunity for a deeper and more prolonged immersion in this experience. Research confirms that "chronic participation in strategic sports significantly reduces stress" [7].

Debates and discussion clubs are one of the most effective forms of extracurricular activity for the development of critical thinking and communication skills. Here the following are directly developed: critical thinking (MM-6) - through analyzing arguments, searching for evidence, and evaluating the reliability of information; constructive argument (MM-7) - through argumentation, the ability to listen to an opponent, answer questions, and not resort to personal attacks; eloquence (MM-2) - through public speeches, formulating a position, and persuading an audience; information search and analysis (MM-9) - through collecting facts and evidence; Socratic dialogue (MM-5) - through questions and answers during debates; emotional intelligence (MM-3) - through managing emotions in the stressful situation of a public argument. A study in Boston schools showed that "debate had a positive effect on English language test results," and moreover "the gains were concentrated in analytical rather than mechanical skills" [11].

Scientific and research projects and participation in conferences are a form of extracurricular activity that develops research thinking. Here the following are developed: cause-and-effect relationships (MM-1) - through formulating hypotheses and testing connections; critical thinking (MM-6) - through planning an experiment, analyzing data, and evaluating the reliability of results; information search and analysis (MM-9) - through work with scientific literature and databases; forecasting and strategic thinking (MM-11) - through forecasting results and planning research; eloquence (MM-2) - through writing scientific articles and presenting results. Research shows that "participation in AI-focused project-based science clubs supports the development of complex thinking and scientific thinking" [16]. And "the integration of inquiry-based and project-oriented learning creates a new model for improving teamwork and critical thinking skills" [16].

Volunteering and social projects develop social responsibility, empathy and practical skills. Here the following are developed: emotional intelligence (MM-3) - through interaction with different people and understanding their needs and emotions; constructive argument (MM-7) - through coordinating positions in a team and resolving conflicts; forecasting and strategic thinking (MM-11) - through planning and implementing social projects; critical thinking (MM-6) - through analyzing social problems and finding effective solutions; eloquence (MM-2) - through publicly presenting projects, attracting volunteers, and communicating with partners.

Intellectual games - chess, go, backgammon, preference - are a special form of extracurricular activity that directly trains strategic and logical thinking. Here the following are developed: forecasting and strategic thinking (MM-11) - directly, through calculating options, evaluating a position, and planning strategy; critical thinking (MM-6) - through evaluating a position, searching for the best move, and analyzing errors; long-term memory (MM-4) - through memorizing openings, endgames, and typical positions; spatial imagination (MM-10) - through visualizing the board and possible moves; emotional intelligence (MM-3) - through managing emotions in the game and resilience to defeats. Research shows that "playing chess develops critical thinking, concentration and strategic decision-making skills that extend far beyond the chessboard" [1].

Robotics and programming clubs develop algorithmic and computational thinking. Here the following are developed: cause-and-effect relationships (MM-1) - through building algorithms and understanding logical chains; forecasting

and strategic thinking (MM-11) - through forecasting the operation of a program or robot; critical thinking (MM-6) - through debugging, finding and correcting errors; spatial imagination (MM-10) - through 3D modeling and work with spatial constructions; long-term memory (MM-4) - through memorizing syntax, data structures, and algorithms. Research shows that "Code Club - a structured learning program offered as an extracurricular activity for students aged 9-13" - gives "positive effects with respect to resilience (+0.22), confidence (+0.47), sense of belonging (+0.09) and programming skills (+0.24)" [12]. And the hackathon as a form of extracurricular activity "effectively develops creativity, critical thinking, communication, collaboration, information literacy and life skills" [13].

Camps and field schools are a form of intensive immersion in activity that provides unique opportunities for the development of all eleven mechanisms through intensive, immersive, round-the-clock involvement. Especially developed are emotional intelligence (MM-3) and constructive argument (MM-7) - through living in a collective, resolving conflicts, and joint activity; spatial imagination (MM-10) and forecasting (MM-11) - through orienteering in an unfamiliar environment and planning hikes and expeditions [1].

**Extracurricular Activity as a "Point of Entry" for Identifying Unique Abilities**

In the fifth article [1], I introduced the key principle of my model - individualization through unique abilities. I wrote then: "Some children have abilities for music, others for dance, others for mathematics, and still others for working with wood or metal. And it is precisely through the prism of these identified unique abilities that each individual child will have the opportunity to develop the other mental mechanisms." Now I want to emphasize: extracurricular activity is the main space where these unique abilities can be identified. In a lesson, a child is limited by the curriculum, time, and format. He must do the same as everyone else. In extracurricular activity, he can choose what is interesting to him, try himself in different areas, and find his "point of entry." Research confirms: "participation in extracurricular activity has a positive influence on the development of communication skills, responsibility and self-esteem" [15]. And "non-attendance of extracurricular school activity" can reduce the development of the skill of "reflection, self-checking and correction" [16].

What does this mean in practice? A child who feels insecure in mathematics lessons can discover chess in extracurricular activity - and through chess develop strategic thinking, which will then transfer to mathematics. A child who cannot find a common language with classmates can come to a theater studio - and through work on a role develop empathy, non-verbal communication, and emotional intelligence. A child who is bored in physics lessons can come to a robotics club - and through constructing robots understand the physical laws that seemed to him boring and abstract. That is precisely why I insist: extracurricular activity is not "additional" education, but an integral part of education. Without it, we do not give a child the opportunity to find himself, to manifest his unique abilities, to find his "point of entry" into the world of thinking. As I showed in the fifth and eighth articles [1], the implementation of this principle requires appropriate infrastructure - studios, workshops, sports facilities, club rooms. But infrastructure is only a condition. Extracurricular activity itself requires thoughtful design, pedagogical support, and a diversity of forms and content.

**Diagnostics: Natural, Long-Term, Comprehensive**

As I have already shown in the sixth article [2], the diagnostics of mental mechanisms must be procedural, dynamic, and embedded in learning itself. Extracurricular activity provides unique opportunities for this. How does diagnostics in extracurricular activity differ from that in the lesson? First, it is natural. In a lesson, diagnostics is a special event (a test, an examination). In extracurricular activity, the development of mechanisms manifests itself naturally - in play, in creativity, in competition. The teacher does not need to create an artificial situation for diagnostics - he observes the child in activity. Second, it is long-term. Extracurricular activity lasts not one lesson, but often for years. This allows one to see the dynamics of development, and not only a static cross-section. Third, it is comprehensive. In one extracurricular activity, many mechanisms manifest themselves simultaneously. Chess is both strategic thinking, and memory, and spatial imagination, and emotional intelligence. Theater is both emotional intelligence, and non-verbal communication, and eloquence, and memory.

For diagnostics in extracurricular activity, I propose to use: pedagogical observation - recording how the child manifests himself in different types of activity; a portfolio of achievements - a collection of works, projects, diplomas, and reviews that show the child's development; reflective diaries - the child's records of what he learned, what he understood, and what changed in his thinking; self-assessment and mutual assessment - the child's assessment of his

progress and the progress of his comrades; analysis of activity products - an assessment of how the child's thinking develops through the products he creates (drawings, programs, projects, performances). An example of dynamics (using the example of a chess club): at the beginning of the year the child plays intuitively, does not calculate options, does not analyze the position, and reacts emotionally to defeats - becomes upset and may abandon the game. In the middle of the year he begins to calculate 1-2 moves ahead, analyze simple positions, and learns to cope with emotions after defeats. At the end of the year he calculates 3-4 moves ahead, analyzes complex positions, sees strategic plans, reacts calmly to defeats, analyzes errors, and transfers strategic thinking to other areas (academic tasks, time planning). It is precisely such dynamics, and not a static assessment, that should be the subject of diagnostics [2].

**Infrastructure as a Cognitive Niche**

As I have already shown in the fifth and eighth articles [1], the development of mental mechanisms requires appropriate infrastructure. For extracurricular activity, this means creating diverse spaces where a child can try himself in different types of activity. By creating this infrastructure, we form what Andy Clark and Kim Sterelny call a cognitive niche (Issue 3, Art. 13). Infrastructure is not merely "premises," but the material part of the environment that provides scaffolding for the development of mental mechanisms. Without this niche, the mechanisms remain abstract concepts. I have already given a full list of the necessary spaces in the fifth article [1]. Here I want to emphasize that each of these spaces is not merely a "room," but an environment for the development of specific mental mechanisms: art studios - the development of emotional intelligence (MM-3), spatial imagination (MM-10), and non-verbal communication (MM-8); music studios - the development of emotional intelligence (MM-3), long-term memory (MM-4), and non-verbal communication (MM-8); dance studios - the development of non-verbal communication (MM-8), spatial imagination (MM-10), and emotional intelligence (MM-3); sports facilities - the development of strategic thinking (MM-11), spatial imagination (MM-10), and non-verbal communication (MM-8); wood and metal workshops - the development of spatial imagination (MM-10), forecasting (MM-11), and cause-and-effect relationships (MM-1); photo studios - the development of spatial imagination (MM-10), critical thinking (MM-6), and eloquence (MM-2); vocal studios - the development of non-verbal communication (MM-8), emotional intelligence (MM-3), and eloquence (MM-2); intellectual game studios - the development of strategic thinking (MM-11), critical thinking (MM-6), and long-term memory (MM-4); science laboratories - the development of cause-and-effect relationships (MM-1), critical thinking (MM-6), and information search and analysis (MM-9). As I have already emphasized, the creation of this infrastructure is not an expense, but a strategic investment. Every child who finds through these spaces his "point of entry" receives a powerful impulse for the development of all the other mental mechanisms [1].

**Bridges Between Lessons and Extracurricular Activity**

Extracurricular activity does not exist in isolation from lessons. It must be connected with them - and this connection can be mutually reinforcing. Extracurricular activity as a continuation of the lesson: a robotics club - a continuation of physics and informatics lessons; a theater studio - a continuation of literature lessons; a chess club - a continuation of mathematics and logic lessons; an ecology club - a continuation of biology and geography lessons. Extracurricular activity as a source for the lesson: the experience gained in extracurricular activity can become material for the lesson. A child who has participated in debates better understands what argumentation is in a rhetoric lesson. A child who has played chess more easily masters strategic thinking in a logic lesson. Extracurricular activity as a bridge between subjects: extracurricular activity naturally connects different subjects. A project to create a school garden is both biology, and geography, and mathematics, and labor. A theatrical production is both literature, and music, and rhetoric, and psychology. Research confirms: "the integration of project-oriented learning, problem solving and computational thinking into curricula positively influences students' critical thinking and computational skills" [16].

**Conclusion: A Space of Freedom and Development**

I want to end this article with what is perhaps the most important. Extracurricular activity is not "additional" education and not an "entertainment" for children. It is a space of freedom in which a child can find himself, manifest his unique abilities, and develop mental mechanisms in conditions that cannot be created in a lesson. It is precisely in extracurricular activity that a child learns to choose - and therefore to take responsibility for his choice. It is precisely in extracurricular activity that those unique abilities manifest themselves which become the "point of entry" for the development of all the other mental mechanisms. It is precisely in extracurricular activity that the personality is formed, and not only "knowledge, abilities, skills." A meta-analysis of 37 studies confirms: "participation in after-

school programs has a positive influence on the cognitive and non-cognitive development of students" [10]. The debate study shows that "the effect was greatest among students with the lowest achievement prior to participation" [11]. The hackathon study shows that it "effectively develops creativity, critical thinking, communication, collaboration, information literacy and life skills" [13]. The Code Club study shows "positive effects with respect to resilience, confidence, sense of belonging and programming skills" [12]. These studies are not merely numbers. They are proof that extracurricular activity works. That it develops thinking. That it changes the lives of children. That is precisely why I insist: extracurricular activity must be not a "elective," but an integral part of school life. It requires no less attention than lessons. It requires thoughtful design, pedagogical support, and a diversity of forms and content. It requires infrastructure - studios, workshops, sports facilities, club rooms. It requires time - in the school schedule, in the life of the school. As I showed in the article "Epistemological Recursion in Cognitive Science" [9], without the development of mental mechanisms humanity will not be able to solve the "hard problems" of the 21st century. Extracurricular activity is the space where these mechanisms can develop in conditions of freedom, voluntariness, and enthusiasm. And if we want our children to become not merely knowledgeable, but thinking, creative, integral personalities - we must give them this space in full measure. Not for the sake of a checkmark. Not for the sake of reports. For the sake of development. In the next, concluding article of this series, I will summarize all that has been said and propose an integral system of diagnostics and assessment of the development of mental mechanisms within the framework of the CCFP model.

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