The Historical Necessity of Changing the Pedagogical Model: From the Industrial Conveyor to Post-Industrial Thinking

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Abstract

In this article, I address an issue that, in my view, is key to understanding why we cannot simply "wait" or "endure" the crisis in education. The shift in the pedagogical model is not a matter of taste, a tribute to fashion, or a whim of reformers. It is a historical necessity driven by fundamental changes in the mode of production, social organization, and the very type of human existence. Relying on a historical analysis of the formation of mass schooling, international studies (including the experiences of Sweden, Japan, China, Australia, Indonesia, and Thailand), modern concepts of human capital development, and evolutionary-psychological research, I demonstrate that the conveyor-belt school, created for the needs of industrial society, is not just outdated - it actively hinders human development. The transition to a model focused on developing the communicative-cognitive framework of personality (CCFP) and mental mechanisms is not merely desirable, but historically inevitable. The evolutionary mismatch between human biological nature and the organization of modern schooling makes this transition unavoidable. However, realizing this historical necessity is only the first step. The second, equally important step, is creating the material and technical infrastructure that will allow this model to be realized: studios, workshops, sports facilities, where every child can manifest their unique abilities. It is precisely this infrastructure that transforms the school from a conveyor belt into a space for unlocking potential, and its creation is not an expense, but a strategic investment in the future.

Keywords: historical necessity, conveyor-belt school, post-industrial society, evolutionary mismatch, CCFP, mental mechanisms, core, support, educational infrastructure, individualization, investment in the future.

From Desirability to Necessity

In previous articles, I attempted to show the current state of modern pedagogical practice and why it is so resistant to change. However, this analysis alone might give the impression that I am merely describing a static problem. As if to say: the school is bad, but what can be done, this is how it historically evolved, and changing it is difficult.

This would be not only incorrect but also dangerous. I am convinced that we are dealing with a historically outdated model that persists not because it is good, but because the mechanisms of its reproduction are extremely strong. But these mechanisms are not eternal. Sooner or later, the pressure of external circumstances will become so great that the system will either change or collapse. And if it collapses under pressure rather than transforming consciously, the price of this collapse will be colossal.

Shalva Alexandrovich Amonashvili, reflecting on the nature of the pedagogical process, spoke of the "fourth dimension in pedagogical thinking" - a spiritual aspiration upward, accepting the child as they are. But this fourth dimension cannot be realized within the industrial model. The industrial school is inherently anti-human - it levels the personality, subordinating it to a standard. And the only way to overcome this is to realize the historical necessity of changing the paradigm itself.

As I have already shown in previous articles, the modern school is in deep contradiction with the evolutionary nature of man - this is the so-called evolutionary mismatch. And this mismatch is not just a "problem" that can be solved with cosmetic changes. It is a fundamental contradiction that requires a radical restructuring of the entire system. That is why I speak of necessity, not desirability.

But realizing this necessity is only the first step. The second step is to understand what exactly should replace it. And here I want to emphasize: the new model of education requires not only new pedagogical methods, but also a new material and technical base. The industrial school was equipped for its time: classrooms, blackboards, textbooks, desks. The school of thinking requires different equipment: spaces where a child can manifest their unique abilities - painting, music, and dance studios, wood and metal workshops, sports facilities, photo studios, rooms for intellectual games. Without this infrastructure, the principle of individualization through unique abilities remains a declaration. And creating this infrastructure is not an expense, but a strategic investment in the future.

How the Conveyor-Belt School Was Born

To understand why we find ourselves in the current situation, it is necessary to turn to history. The mass school, as we know it, is a child of the industrial revolution. It did not arise by chance, nor was it invented by evil bureaucrats. It was necessary for the needs of developing capitalist production.

In the 1960s, people in the West began to realize that they were in a societal transition. The era was given various names - educational, post-industrial, and later information society - all of which in some sense meant the departure of the old industrial order [1]. Higher education here became the new focal point of society and the driving force of growth.

In Sweden, which in future research was recognized as a pioneer in promoting the post-industrial society, the conservative party was one of the first to articulate the ideas of this transition. "The educated voter was constructed by the conservative party as the new leading class in an education-oriented society" [1]. This shows that the realization of the transition to a post-industrial society and its impact on education is not something new - it began back in the 1960s.

Historians of education note: "The task of higher education was normative - to strengthen faith and the state" [2]. A few hundred years ago, universities were for a fortunate minority - perhaps 1 or 2 percent of each age group. The demand for professionals such as teachers, doctors, lawyers, and priests was not intense. However, by the end of the 20th century, the structure of society was changing rapidly. Post-war industrial growth, the reduction and industrialization of agriculture and forestry, and a sharply increased demand for intellectual services - research and development, advanced education, highly qualified experts and specialists - radically changed the face of Western societies. It was during this period that the understanding began to form that we were entering a post-industrial era, and the public service sector was expanding as society took responsibility for people "from cradle to grave" [1].

Structure and Functions of the Industrial Conveyor

What did the conveyor-belt school look like in its classical form? First of all, it was uniformity. All children had to study the same things, at the same pace, using the same textbooks. Differences between children were viewed as a defect that needed to be overcome or, at best, "compensated for" with extra classes.

Secondly, it was hierarchy. The teacher is the boss, the student is the subordinate. The teacher gives commands, the student executes them. The teacher evaluates, the student receives a grade. The entire structure of the school reproduces the hierarchy of a factory or a bureaucratic organization. Thirdly, it was standardization. Knowledge is broken down into standard blocks. Success is measured by standardized tests. The student's career trajectory is predetermined: they must pass through all grades, pass all exams, and receive a standard document.

Fourthly, it was discipline. The main virtue of a student is obedience. The main vice is disobedience. Discipline is maintained by a system of rewards and punishments, at the center of which is the grade. And finally, it is a focus on checking facts rather than developing thinking. The traditional assessment system fits perfectly into this model. It is simple, understandable, easily scalable, and allows for ranking students.

This model was genius in its simplicity and efficiency. It allowed, in a relatively short time, to turn a child from a "wild" creature into a "civilized" worker suitable for inclusion in the production process. And it worked - as long as the production process remained stable and the requirements for the worker did not change [2], [6]. The problem is not that these characteristics are "bad," but that they have ceased to correspond to new requirements. The conveyor-belt school was a condition for the possibility of industrial society, but it is not a condition for the possibility of post-industrial society.

The Post-Industrial Transition and Its Limits

In the 1960s, as historical research shows, "people across the West began to realize that they were in a societal transition." In these future-oriented discussions, "social class was often transformed into the level of education as the main dividing line" [1]. These future studies attracted attention across the political spectrum, including the Swedish conservative party. The structure of society was changing rapidly. "Social mobility is high. After 1945, industry grew at a huge rate; agriculture and forestry declined and industrialized. Society's needs for intellectual services changed radically: research and development, advanced education and research, highly qualified experts and specialists - all this became in demand" [1].

The key observation is that "the educated voter was constructed by the conservative party as the new leading class in an education-oriented society" [1]. The social division, which was once determined by class, was now to be determined by the level of education. Researchers note that the conservative party saw "the societal changes brought by the post-industrial society as their chance to restructure the electorate and the political landscape in their favor" [1]. This shows that the realization of the transition to a post-industrial society had not only an intellectual but also a political dimension.

However, as further history shows, the transition to a post-industrial society in itself did not lead to an automatic transformation of the school. Institutional inertia, the traditional assessment system, personnel inertia - all this continues to keep the school within the framework of the industrial model, even when the world around it has already changed. The experience of Australia [3] shows that even with a doubling of funding, reforms may not yield results if they do not change the culture of education. The experience of Indonesia [9] shows that even the most ambitious reforms, such as Merdeka Belajar, can remain at the level of declarations if teachers are not prepared and the infrastructure is not created. The experience of Thailand [10] shows that political instability can nullify any reform efforts.

Evolutionary Mismatch as the Engine of Necessity

Researchers who published works in the journals *Encyclopedia* and *Behavioral Sciences* in 2025 highlight eight typical school problems associated with evolutionary mismatch [4], [5]. These problems are not accidental - they are a consequence of the fundamental contradiction between human biological nature and the organization of the modern school. In hunter-gatherer tribes, children learned through practical, joint experience. In modern schools, children learn in age-graded classes through passive learning and standardized curricula. In traditional societies, children learned through self-directed, mixed-age play groups, and adults did not interfere. In modern schools, a strict schedule and constant control dominate. Reading, writing, and mathematics are evolutionarily new skills that are not supported by the same built-in brain mechanisms that provide language acquisition. And finally, the school chains children to desks for long hours, although they are evolutionarily adapted to movement and active play [4].

Researchers emphasize that "child nature clearly demands visuality" (as K.D. Ushinsky wrote [11]), and that modern schools create an "evolutionary mismatch for boys to a greater extent than for girls, due to sex differences in physical activity levels and social relationships. This leads to boys being disproportionately identified as having behavioral difficulties" [4]. The conveyor-belt school is not just socially and economically outdated - it contradicts human biological nature.

But it is important to emphasize here: evolutionary mismatch is not just a "problem" to be "solved." It is a condition that the school must take into account if it wants to develop mental mechanisms. In the revised Article 5 [18], I show that the mechanisms of the core (MM-1, MM-3, MM-5, MM-6, MM-10, MM-11) and support (MM-2, MM-4, MM-7, MM-8, MM-9) are formed only under certain conditions - through active exploration, play, and cooperation. The conveyor-belt school blocks these conditions. That is why evolutionary mismatch is not a "background," but a structural obstacle to the formation of the CCFP. An evolutionarily appropriate environment is a condition without which the formation of mechanisms is impossible.

The Price of Delay

Why does this make changes historically necessary? Because evolutionary mismatch has real, measurable consequences. Researchers note that children experience impaired social skills, high levels of general and academic anxiety, low motivation and engagement, and antisocial behavior [4]. These consequences are not "pedagogical problems" in a narrow sense - they are indicators that the system does not meet the biological needs of children. In

Australia [3], these consequences manifest in a crisis of attendance and retention. In Malawi [12], they manifest in catastrophically low quality of learning.

And as long as we maintain a system that does not correspond to the biological nature of children, we will observe a growth in anxiety, depression, burnout, and school refusal. This is not a "moral" argument - it is an empirical fact confirmed by research [4], [5]. And this fact makes changes not just desirable, but necessary. The crisis of the school is not a problem of "insufficient funding" or "bad teachers," but a problem of an exhausted paradigm. The conveyor-belt school was adequate for industrial society, but it is inadequate for post-industrial society. And no cosmetic reforms can change this.

I do not want to be a pessimist, but I am obliged to ask the question: what will happen if we continue to preserve the old model, clinging to standardized exams, standards, and familiar methods? First, a growing lag. The world will change faster and faster, while the school will change slower and slower. The gap between what is taught and what is needed will widen. Graduates will become less and less competitive in the labor market [2]. Second, social degradation. People who cannot think critically easily become victims of manipulation. They cannot distinguish truth from lies, facts from fakes, rational argumentation from emotional pressure. This leads to the destruction of democratic institutions, the growth of populism and authoritarianism. Third, an ecological and technological crisis. Solving global problems requires people capable of systemic thinking, forecasting consequences, and making responsible decisions. The conveyor-belt school does not prepare such people [5]. Fourth, an epidemic of mental disorders among children and adolescents. A school that contradicts the biological nature of children leads to an increase in anxiety, depression, burnout, and impaired social skills [4], [5].

As K.D. Ushinsky said, "education only goes along this road and, acting together with other social forces, helps individuals and new generations to go along it" [11]. But if education does not go where society is moving, it becomes not a helper, but a brake. We cannot allow education to be a brake. Preserving the old model is a condition for the impossibility of solving the "hard problems" of the 21st century.

Lessons from Asia: Attempts at Transition

The Japanese and Chinese experiences are particularly important for understanding how countries with deep traditions of educational conservatism are trying to transition to new models. In the 1990s, Japan faced new challenges. The economic bubble burst, and a period of stagnation began. Society faced the problems of a "lost generation," student burnout, a rise in the number of school refusers (*hikikomori*), and juvenile delinquency. It became obvious that "examination hell" does not prepare people for life in a rapidly changing world. In response to these challenges, the Japanese government initiated reforms known as *Yutori kyoiku* (relaxed education) [6]. These reforms pursued ambitious goals: to give students more "freedom to grow" (*yutori*), reduce the number of school days per year, decrease textbook content by about 30%, and introduce experiential learning in the form of a "comprehensive study period" [6].

The reforms were aimed at "restructuring education to cultivate the types of skills and knowledge presumed necessary for the 21st century. First and foremost, these were problem-solving and critical thinking skills, which were thought to be lacking in catch-up-oriented education" [6]. However, as practice has shown, Japanese reforms faced serious problems. "Early implementation problems showed that bold reforms were launched without sufficient preparation and under conditions of great uncertainty. One of the main reasons was a lack of sufficient resources" [6]. Individualized learning required smaller class sizes, but large class sizes in Japanese schools remained unchanged because the government did not invest enough to increase the teaching staff. In addition, "teachers were not given sufficient resources to master new teaching skills, which meant that the reforms only made teachers busier than before" [6]. The reforms also led to unintended consequences: there was an "exodus of the middle class from public schools to private ones" [6], which led to an "increase in educational inequality both in terms of family background and cognitive abilities" [6].

The Chinese experience is no less indicative. Reforms in China began in the 1980s, when the country realized that rote memorization did not prepare people for the challenges of modernization. In 1985, the "Decision on the Reform of the Educational Structure" was adopted, which proclaimed the transition from "examination-oriented education" to "quality education" (*suzhi jiaoyu*) [2], [13]. The term *suzhi jiaoyu* was first introduced in 1987, but did not become state educational policy until 1999 [2], [7], [13]. In 2001, the "Basic Education Curriculum Reform" program was adopted, which became the most large-scale reform in China's history. It included a transition from subject-centrism to integration, the introduction of "inquiry-based learning" (*yanjiu xing xuexi*), the expansion of school autonomy,

and the reform of the assessment system [2], [13], [14]. In 2010-2020, the reforms reached a new level. China proclaimed a transition to "education focused on the development of key competencies" (*hexin suyang*) [8], [14]. As researchers note, "besides the fact that China is going global and not falling behind the developed West, it simultaneously strives to remain local and cultural as a counter-discourse against Western hegemonic globalism" [8].

Chinese reforms face serious challenges. The biggest problem is the *gaokao*, which remains the dominant factor in education. Teachers, parents, and students are forced to adapt to exam requirements, which creates a gap between the declared goals of the reforms and real practice. Nevertheless, the Chinese experience shows that even in a country with a huge number of students and deep traditions of "cramming," systemic changes aimed at developing thinking are possible [11]. The experience of Japan and China shows: the transition to a new model is possible, but it requires not cosmetic reforms, but systemic changes - including teacher training, infrastructure creation, and changes in the assessment system.

Infrastructure of the Future: From Conveyor to Space of Unfolding

Realizing the historical necessity of changing the pedagogical model is only the first step. The second, no less important step, is to understand what conditions are necessary for the implementation of the new model. And here I want to draw attention to what often remains in the shadows of pedagogical discussions: the material and technical base of the school. The industrial school was equipped to solve its tasks. Classrooms, blackboards, textbooks, desks - this was enough for the transmission of knowledge and the preparation of disciplined executors. But the school of thinking, the school of personality development, requires different equipment.

In the CCFP model, the key principle is individualization through unique abilities. This principle assumes that every child should have the opportunity to manifest their internal, "hidden" abilities - in music, painting, dance, sports, wood or metal processing, intellectual games. But how can a child manifest these abilities if the school does not have the corresponding spaces? In the revised Article 5 [18], I show that infrastructure is not an "additional option," but the material basis for the formation of the core. If we want a future researcher to have developed spatial imagination (MM-10), they must work with volumetric materials from childhood - sculpting, constructing, building. If we want them to have developed emotional intelligence (MM-3), they must have experience expressing emotions through different mediums from childhood - music, dance, painting. Infrastructure is not "scenery." It is a condition for the possibility of forming mental mechanisms.

Therefore, I insist that the school must be equipped with truly diverse infrastructure. We need art studios where children can work with different materials - from watercolor to oil, from graphics to sculpture. We need music studios with a minimal but sufficient set of instruments for classical, wind, and pop music: not just a piano in the assembly hall, but also guitars, violins, wind instruments, drum kits. We need dance studios, and not only in the classical direction, but also folk, street styles, fitness directions - spaces with mirrors, barres, and good flooring. We need sports facilities, not just a gym with two pieces of equipment and ten mats - full-fledged facilities for gymnastics, light and heavy athletics, fitness, and swimming. We need workshops - small production premises equipped with good wood and metal lathes, places where a child can work with their hands, create, construct, and embody their ideas in material. We need photo studios for photography, videography, and digital art. We need soundproof vocal studios. We need rooms for intellectual games.

Of course, serious funds are necessary for such a list of objects. But I want to emphasize: these funds are not expenses. This is an investment in the future of the country, in the future of humanity. Every child who finds their "point of entry" through unique abilities receives a powerful impulse for the development of all other mental mechanisms. A child with musical abilities develops cause-and-effect thinking through the analysis of musical structures, emotional intelligence through the expression of feelings in music, spatial imagination through the representation of musical notation. A child with technical abilities develops the same mechanisms through construction, analysis of mechanisms, and forecasting the behavior of technical systems. This infrastructure transforms the school from a conveyor belt into a space for unlocking potential. And it is precisely such a school that meets the challenges of the post-industrial era - an era where the main resource is not knowledge of facts, but the ability to think, create, adapt, and create something new.

The experience of Kyrgyzstan [15] shows that even with limited resources, innovative spaces can be created if there is trust in teachers and community support. The experience of Singapore [16] shows that systemic investments in infrastructure and teacher training can yield outstanding results. But these examples remain local. Our task is to make this model mass. The connection between infrastructure and the formation of the core can be explained through the

concept of a cognitive niche. Infrastructure is the material part of the cognitive niche. Without it, the niche is incomplete: the child does not receive the sensory and motor experience necessary for the development of certain mechanisms. This is not a metaphor: neuroplasticity research shows that the development of certain cognitive functions requires a certain type of experience during sensitive periods.

Conclusion: Necessity as a Challenge and an Opportunity

Thus, the historical necessity of changing the pedagogical model is not a rhetorical figure. It is an objective fact that follows from the analysis of economic, social, cultural, and evolutionary changes of recent decades. The industrial school was created for industrial society. It brilliantly performed its task - preparing disciplined executors. But industrial society is in the past. We live in a post-industrial, information society, where the main resource becomes the ability to think, create, and adapt.

As the experience of Japan and China has shown, the transition to a new model of education is a complex, contradictory, and often painful process. Reforms can encounter resistance from teachers, misunderstanding from parents, lack of resources, and unintended consequences. But this transition is inevitable - and the sooner we begin to do it consciously, the lower the price of delay will be.

My model of the communicative-cognitive framework of personality (CCFP) and mental mechanisms offers precisely such a conscious path. It does not deny the need for knowledge, but it does not translate them from an end into a means - a means of developing mental mechanisms that make a person capable of adaptive, creative intelligence. It takes into account the evolutionary nature of man, offering learning through play, cooperation, and exploration. It rejects the traditional assessment system in favor of dynamic diagnostics of progress in skill development [4], [5].

But for the realization of this model, not only a change in the pedagogical paradigm is necessary, but also the creation of new infrastructure. Painting studios, music classrooms, wood and metal workshops, sports facilities, dance halls, photo studios, rooms for intellectual games - these are not a "luxury" or "additional clubs." These are necessary conditions for every child to be able to manifest their unique abilities and, through them, develop all other mental mechanisms. This is an investment in human capital - an investment that pays off many times over, because it creates not just "educated people," but people capable of thinking, creating, and changing the world [15], [16]. And this path, as it seems to me, is not just possible, but the only possible answer to the challenges of the post-industrial era. It is to this practical path that I will devote the subsequent articles of my issue.

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