



**PHILOSOPHICAL FOUNDATIONS OF STEAM EDUCATION AND THE
FORMATION OF NEW GENERATION THINKING: HARMONY OF
INNOVATIVE WORLDVIEW AND SPIRITUAL MATURITY**

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| ABSTRACT | KEYWORDS |
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| <p>This article analyzes the essence of STEAM education, its role in shaping the mindset of the new generation, and the harmony between an innovative worldview and spiritual maturity from a philosophical perspective. It demonstrates that under the conditions of accelerating digital transformation, the STEAM approach not only develops technical and scientific competencies but also fosters qualities such as creativity, critical thinking, and moral responsibility. The article highlights the integrative and comprehensive nature of STEAM education in forming the cognitive culture, cognitive flexibility, and spiritual maturity of the new generation.</p> | <p>STEAM education, innovative thinking, worldview of the new generation, spiritual maturity, integrative approach, digital transformation, creative thinking, cognitive culture, spiritual values, philosophical foundations.</p> |

Introduction

Today's globalization and digital transformation processes are bringing about radical changes in human thinking, worldview, and forms of learning. In the 21st century, STEAM education, which integrates science, technology, engineering, arts, and mathematics, is recognized as one of the most effective concepts for raising a new generation with innovative thinking, creativity, and a complex approach. This approach not only increases the technological potential of the educational process but also shapes the spiritual and moral maturity, social responsibility, and culture of critical and independent thinking of an individual.

Fostering innovative thinking in the minds of young people yields full results only when it is not limited to technical knowledge but carried out in harmony with spiritual values. Therefore, identifying the philosophical foundations of the balance between innovative development and spiritual maturity is one of the priority tasks of the modern educational process. This article provides a philosophical analysis of the conceptual essence of STEAM education, its impact on the thinking of the new generation, and the dialectical unity of innovative worldview and spiritual education.

STEAM education originated from the STEM (Science, Technology, Engineering, Mathematics) model, which was formed in the 1990s on the initiative of the US National Science Foundation. In those years, due to the acceleration of technological progress, the shortage of scientific and technical specialists became a pressing issue.

In the early 2000s, educational experts and psychologists recognized that human thinking develops not only through technical knowledge but also through creative abilities. Thus, the element of Art—encompassing arts, design, and creativity—was added to the STEM concept, forming the STEAM model. This approach enriched students' technological knowledge with aesthetic and design thinking. Starting from the 2010s, countries such as the European Union, South Korea, Japan, and Singapore began raising STEAM education to the level of state policy. They introduced robotics, engineering laboratories, creative spaces, and STEM/STEAM centers into the educational process [1].

In Uzbekistan, since 2017, along with the intensification of modernization processes in the education system, special attention has been paid to the STEAM direction. In the Republic:

- Specialized schools and technoparks were established;
- Robotics, programming, and 3D design clubs expanded;
- Educational and methodological materials aligned with international STEAM programs were created;
- Technology rooms and STEAM laboratories began to be equipped in schools.

The thinking of the new generation is a multi-layered process shaped by contemporary demands, embodying fast, flexible, systemic, and creative thinking. In the context of global competition, it is no longer sufficient for young people to merely possess knowledge; qualities such as processing, evaluating, and applying it in practice, as well as making independent decisions in specific situations, are gaining paramount importance.

Key characteristics of the new generation's thinking:

1.Creativity and inventiveness – the ability to generate new ideas, find alternative solutions, and interpret existing experience in a new way.

2.Cognitive flexibility – the capacity to process complex information flows and change thinking strategies in various situations.

3.Systemic thinking – perceiving reality as a system of interconnected elements.

4.Digital literacy – the effective use of modern technologies and understanding information security.

5.Spiritual reflection – awareness of one's actions, evaluating them based on moral criteria, and being responsible to society.

Although the formation of these qualities is directly related to the intellectual potential of young people, its foundation is determined by cognitive processes, an innovative environment, and spiritual education.

Cognitive processes comprise a complex of activities such as perception, memory, attention, thinking, imagination, analysis, and synthesis, which define an individual's level of thinking. Modern science focuses on the following aspects of shaping cognitive capabilities:

Neurobiological research shows that the adaptability of human brain function (neuroplasticity) creates the foundation for the flexible and creative thinking of young people. When school-aged children tackle

complex tasks, active neuronal connections form in their frontal cortex, which enhances logical thinking.

Cognitive strategies include analytical thinking, conceptual prioritization, understanding problem situations, and decision-making processes. All of these constitute the foundation of the thinking of the new generation.

The interests of young people, their internal need for learning, and their drive for independent research activate their thinking processes. In this regard, the innovative and interactive nature of teaching methods plays a major role [2].

Digital technologies, simulations, mobile applications, and artificial intelligence-based educational platforms significantly activate cognitive processes and individualize the learning process for young people.

The formation of the thinking of the new generation is a complex and multifaceted process that relies on the harmonious integration of cognitive, innovative, and spiritual factors. While cognitive processes lay the foundation for thinking, innovative factors determine its dynamic development. STEAM education, in turn, strengthens the methodological basis of this process.

The impact of STEAM education on a student's spiritual maturity is incomparable. It develops qualities such as creativity, responsibility, cooperation, honesty, aesthetic taste, diligence, and social activity. This serves as a decisive factor in raising a young generation that possesses modern thinking, is spiritually mature, and is intellectually well-rounded.

The widespread introduction of the STEAM approach into the modern educational process ensures the enhancement of young people's competitiveness, creates the foundation for an innovative society, and, most importantly, secures the upbringing of a spiritually mature, responsible generation [3].

An innovative worldview is a way of thinking that values novelty, allowing one to re-envision existing knowledge, experience, and perceptions in new combinations, deeply analyze the interconnectedness of phenomena, and seek unconventional solutions to complex problems. Such a worldview not only changes a person's concepts of existence but also redefines their life goals. A person possessing innovative thinking prioritizes a creative approach in the processes of observing, analyzing, synthesizing, and evaluating reality. The internal dynamism of this process strengthens human mental capacity and stimulates an active attitude toward social processes.

Spiritual maturity, on the other hand, is the process of elevating a person's inner world and perfecting their moral, aesthetic, social, and intellectual qualities. This process serves to shape a human being as a well-rounded individual. A person who has achieved spiritual maturity integrates principles such as justice, honesty, conscience, responsibility, patience, perfect thought, generosity, and compassion into the meaning of their life. Thus, spiritual maturity defines the meaningful foundation of innovative thinking. This is because the process of creating novelty must rely not only on technical skills but also on values such as the purity of purpose, social interests, spiritual cleanliness, and responsibility.

From a philosophical point of view, the harmony of an innovative worldview and spiritual maturity traces back to two main directions in human perception of existence: the development of the cognitive process and the spiritual-moral perfection of man. These two processes do not occur independently of each other. As human knowledge deepens, one gains the opportunity to understand one's own essence; as one understands one's own essence, one strives to know existence even more deeply. In this sense, innovative thinking and spiritual maturity manifest as two processes nourished by the same root.

The philosophical interpretation of modern innovative processes shows that any novelty is first born in the human mind as an idea. The effectiveness of an idea is determined by the spiritual level of the person who created it. If an idea is directed solely toward material interest, it can bring more harm than benefit to society. However, innovation formed on the basis of spiritual elevation develops society, increases human potential, and strengthens the foundation of sustainable progress. Therefore, spirituality is the internal criterion that defines the primary direction of innovation.

The current stage of societal development is characterized by globalization, digital transformation, and rapid changes in scientific and technical achievements. Under these conditions, it becomes difficult for a person lacking innovative thinking skills to become an active participant in society.

At the same time, as the impact of global processes on the human spiritual world grows stronger, an individual without spiritual stability may lose their identity under the influence of various information attacks, ideological pressures, and cultural interferences. This situation reconfirms how vital the harmony between an innovative worldview and spirituality is.

The philosophical essence of this harmony is clearly manifested in the interaction between the process of human knowledge of the world and the process of understanding one's spiritual identity. An innovative worldview leads a person toward new knowledge, while spiritual maturity ensures the correct application of this knowledge. Therefore, the presence of moral criteria in the process of creating novelty is considered the most critical factor in evaluating human activity. Innovative activity lacking spiritual principles can lead to instability, crises, social conflicts, and moral decline.

Although innovation is essentially a novelty-creating process, it is always connected to a spiritual process. This is because a person creating novelty first sets a goal, understands the value of this goal, defines its social significance, and feels responsible for it. Feeling responsibility is one of the signs of a spiritually mature person. In this sense, every idea within an innovative worldview yields positive results only when harmonized with spiritual principles [4].

The harmony of an innovative worldview and spiritual maturity also holds an important place in the process of human self-awareness. As humans realize the capabilities within themselves, they strive to apply them in creative activity. A person who understands their spiritual essence directs every activity toward positive goals. As a result, the individual feels like an active subject contributing to the development of society [5].

The philosophical essence of this harmony is manifested in processes such as understanding one's place in existence, feeling one's responsibility among living beings, and striving to make one's life meaningful. While innovative thinking prompts a person to see themselves as a possessor of limitless capabilities, spiritual maturity ensures that these capabilities are directed toward goodness.

Thus, the philosophical foundations of the harmony between an innovative worldview and spiritual maturity are formed at the junction of two major facets of human nature—cognition and moral identity. The essence of this harmony is that the process of creating novelty becomes not just a product of the mind, but also an expression of spiritual elevation. Consequently, innovative thinking and spirituality are the two supporting pillars of modern societal progress, together constituting the basis for human perfection and the flourishing of civilization.

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