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Innovative Education in Russia: On the Path of Development and Transformation

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Abstract: The article presents the essence and characteristics of innovative education, and also highlights the main elements of the system of teaching innovation creation that has developed in countries leading in innovative education. It lists the reasons why the American innovative education system is difficult to implement in Russia. These include the lack of rights similar to those enjoyed by US universities, the rigid internal hierarchy at Russian universities, which precludes a high degree of organizational initiative by departments, and the weak connection between Russian businesses and the university environment. The integrative approach characteristic of US innovative education, which implies interdisciplinary education and the teaching of the fundamentals of innovative entrepreneurship management, is particularly emphasized. The article also lists elements of the American innovative education system that could be widely adopted, as they would improve the effectiveness of specialist training and would not conflict with the current Russian education system.

Keywords: Systems approach, innovative education, interdisciplinary education, competitiveness

1. Introduction

The development of a national innovation system plays a crucial role in the 21st century for any country seeking economic independence. Analyzing the state of the innovation system, eliminating barriers to innovation development, and critically analyzing initiatives to stimulate innovation processes are particularly important in today's environment, influencing the strategy, goals, and

management methods of both education and industry, as well as the country's economy as a whole.

Of course, large organizations play a key role in the creation of innovation in most economically developed countries. These organizations are capable, often in conjunction with the state, of funding R&D and the entire chain of creating new goods and services^[1]. At the same time, small innovative businesses, consisting of small enterprises in the high-tech sector,



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including venture capital firms implementing high-risk innovative projects, make a significant contribution to the innovation process in economically developed countries. Moreover, they do this quite effectively: for example, according to some estimates, in the United States, the number of patents issued per employee in a small business organization is almost 16 times greater than the number of patents per employee in large enterprises ^[2]. According to other estimates, small businesses in leading Western countries, using up to 5% of the funds spent on research and development, create up to 40-50% of innovations ^[3]. It can also be noted that new small organizations primarily create innovations in market segments with low entry barriers, while large firms create innovations in traditional sectors of the economy ^[1].

A generalization of these facts is the long-term experience of the United States and some other countries, which has shown that the greatest effect on a national scale is achieved if the results of research and development are used ^[4]:

1. Startups financed by venture capital;
2. Small innovative firms;
3. Large firms interested in innovation, operating in competitive markets and investing a significant percentage of their turnover in R&D;
4. Technology transfer centers at universities that accumulate and transfer intellectual property under specific market conditions into civil law circulation.

It should be noted that attempts to simply copy the highly successful and productive American innovation system have not been successful in many countries, including Russia ^[4]. In Russia, over the past twenty years, the work of governing bodies for the development of an innovative economy has been structured with a focus on the preferential support and development of precisely these aforementioned actors in the innovation model. In fact, an attempt was made to reproduce the historically established American innovation system ^[4]. However, the reality in Russia differs from that of the country taken as a model in terms of people's mentality, historical experience, economic structure, the role of the state in society and the economy, values, and other factors. This, in combination, has led, despite significant financial resources and organizational efforts spent on developing the innovation system, to a situation

that differs from the planned one ^[4]. It turns out that the emerging innovation system is based primarily on initiative projects, which, given the monopolization of the vast majority of markets in Russia, end in failure, as demonstrated in ^[4] using statistical data from the past decade. Therefore, the system requires adjustment, taking into account the actual state of the Russian economy.

One of the components of the innovation system is the development of an education system focused on teaching innovation. Currently, there are objective qualitative differences between the education systems in Russia and those in developed countries ^[5]. Until approximately the 1980s, the higher education systems of Russia and leading Western countries were fundamentally similar. However, since the 1980s, the transformation processes that have begun have completely transformed the education systems in the United States and the EU. The main factor that has transformed these systems is so-called innovative education, the definition and characteristics of which will be given below. In our view, it was the development of innovative education systems, and only then the refinement of other parameters, that propelled universities in the US, EU, and Japan into the ranks of global leaders, a status currently unattainable for other countries practicing different systems. China has now joined the ranks of leaders in innovative education, with several of its universities achieving leading positions in existing rankings ^[6].

A detailed analysis of the innovative education system existing in the US, a leading innovative education country, has been conducted in a number of publications ^[7-10], some of whose findings we will draw upon.

2. Results

2.1. The Essence and Characteristics of Innovative Education

Amidst competition among leading economic powers, a focus on accelerated scientific and technological development, the development of a global education market, and the accelerated advancement of information technology, at the end of the 20th century, the world's leading countries faced the need to adjust priorities in their higher education systems. Beginning in the 1980s, new national education systems began to

emerge, with innovative education as a priority. The essence of innovative education lies not in the transfer of ready-made knowledge, but in the development of creative potential and systems thinking, as well as thorough methodological training, on the basis of which future specialists can independently develop the new knowledge they need.

The key characteristics of innovative education include ^[9]:

- interdisciplinary organization of instruction;
- a culture of systems thinking;
- teaching content and methods focused on the creative, constructive activity of students with the goal of developing their innovative capacity.

The innovative educational process can be imagined as a system of creative workshops of authoritative scientists, leading engineers, and industry representatives, where continuity in the methodology of cognitive and innovative activity is realized, traditions of research and invention are transmitted and developed, and the desire for constant professional growth and improvement of oneself and the world around one is fostered.

The innovation education system that has developed in the United States, a leading country in innovative education, over the past several decades owes its emergence largely to the socio-political and cultural-historical conditions in which university education exists in the United States ^[10]:

- the advantages of relative political and administrative autonomy enjoyed by American universities;
- the significant freedom and activity of faculty within the university system;
- the right of departments and individual faculty members to carry out organizational and institutional initiatives (in particular, initiatives to create various types of interdisciplinary structures – centers, institutes, programs, etc.);
- the progressive trend toward the development of interdisciplinary education and the corresponding trend toward the development of interdisciplinary structures at universities;
- the flexibility of the American university education system, characterized by the ability to obtain a variety of dual degree options for the same (or slightly greater) financial investment and in the same (or slightly greater) time required to obtain a basic "single" degree;
- the traditional and long-standing ties of certain

segments of American university education (such as schools of business, management, and administration) with the corporate and commercial environment;

- the traditional respect enjoyed by universities and university education in the corporate and commercial environment;
- the good funding of American universities, which enables them to steadily expand their interdisciplinary structures;
- the possibility of multiple forms of organization, financing, and support for interdisciplinary structures.

However, as is often the case, to transfer certain social technologies to a different socioeconomic environment, it is not necessary to retrace the entire historical path of their creation. It's enough to identify the core, the essential—what a new society needs for development and transition to a new stage—and also to prepare for and take into account the specifics of national psychology, governance characteristics, and the level of development of the socioeconomic system. The successes of some countries in the 20th and 21st centuries are linked precisely to this strategy.

2.2. Reasons for the Difficulty of Developing Innovative Education in Russia

Undoubtedly, our country has accumulated significant experience in innovative education: we have introduced courses on the methodology of scientific, managerial, and engineering activities; implemented systems for developing creative abilities using information technology; and developed a process for incorporating elements of project-based technologies of various types into curricula. However, the development of innovative education is fragmented and unsystematic. Certainly, the imposition of American specifics and conditions on the specifics of the Russian Federation may not always lead to improvements or good results. Any innovation in education must be approached critically and the consequences carefully considered.

Several reasons can be immediately identified why the American innovative education system is difficult to implement in Russia.

First, universities in Russia do not and never have had rights similar to those of US universities.

Second, Russian universities have a rigid internal hierarchy, which precludes a high degree of organizational initiative by departments, chairs, and faculty members. Any changes to programs, structures,

content, any decisions and regulations are made from the top down, not the other way around.

Thirdly, the Russian legal and financial system hinders private donations to education. Unfortunately, the societal climate is such that philanthropy and patronage can encourage financial abuse rather than the creation of innovative educational centers. Many researchers of contemporary Russia point to corruption, the scale of which has become a barrier to the formation of a new scientific, technical, cultural, and educational order ^[11].

Fourthly, in the current Russian education system, it is difficult to obtain a dual education in the form of a "two-in-one" program: a "major specialization" and a "secondary specialization" due to its lack of flexibility.

Fifthly, and this is one of the main reasons, today's Russian business has little connection with the university environment. In Russia, there are perhaps no examples of cooperation similar to the American one.

Sixth, education, work, university studies, and scientific pursuits have ceased to be socially significant pursuits and accomplishments.

Seventh, in post-Soviet Russia, the primary emphasis has traditionally been on fundamental education within specific disciplines. This strategy has its advantages, but also its drawbacks. In particular, in such a system, interdisciplinary education is still in its infancy. Furthermore, there is often a lack of tradition of close interaction between representatives of different disciplines and an understanding of how to establish such collaboration for the development of innovation.

2.3. So, what can and should be borrowed?

The analysis of trends in the development of innovative education in US higher education conducted in ^[7-8] and ^[9-10] allows us to conclude that American higher education is characterized by a shift from the transmission of information during the learning process to the development of the student's personality, specifically the ability to think creatively, create new things, invent, and act independently. This serves as the basis for preparing specialists for innovative activity, which presupposes their ability to comprehensively combine research, project-based, and entrepreneurial activities, creating new competitive products.

Innovative education in the US is characterized by an integrative approach, implying interdisciplinary education, as well as the extensive development of

practical skills during the learning process, which presupposes mastery of the full cycle of innovative activity and the development of specialist qualities appropriate for their future work environment. The integrative approach in the United States includes:

- engaging leading scientists, renowned managers, and industrial leaders to lecture and advise students on research projects, and engaging students in solving practical problems;

- focusing the educational process, its content, organizational forms, and teaching methods on developing students' creative potential, including the inclusion of a series of specialized courses in university curricula aimed at mastering the methodology of scientific and technical creativity;

- interdisciplinary training.

The practice-oriented innovative approach includes:

- teaching students innovation through project-based technologies that allow them to recreate the holistic work process of a researcher, engineer, or manager;

- mastering the economic foundations of innovation and the fundamentals of project management;

- training in effective work in interprofessional teams.

At present, the predominant form of activity in the educational activities of students at most Russian universities involves completing assignments based on a model or instructions without deviation. Elements of experimental research activities by students are often reduced to a minimum or reduced to imitation. In the actual practice of Russian universities, approximately 5% of the teaching time is devoted to creative situations (solving research problems, creative tasks, inventive problems, critical analysis of what has been read, the use of various methods for stimulating inventive activity, experimental research, etc.) ^[5]. In the United States, on the contrary, approximately 50% is aimed at developing creativity ^[10]. At the same time, the main advantage of the American approach remains the systematic approach to solving the problem of developing creativity: a gradual transition from familiarizing students with general creative principles and introducing them to a creative view of the surrounding reality, familiarizing them with the features of creative activity (research, engineering, management) and the fundamentals of intellectual and creative activity through teaching methods for solving

creative problems within the framework of specialized disciplines. This approach encourages student engagement in research, increases student motivation, and develops professionally significant skills.

The use of case study-based methods in American higher education is noteworthy: examining problems in a student's field in the past and present, analyzing powerful creative solutions in world history, and the failures of researchers, inventors, and innovative companies, accompanied by detailed case analysis, discussions, and student proposals for alternative solutions, fosters creative potential, has a positive effect on the development of professionally significant skills, stimulates motivation, develops professional thinking, and broadens horizons.

In connection with the establishment of technology parks at Russian universities and the active organization of small businesses aimed at implementing the results of intellectual activity in production, the collaboration between universities and technology parks practiced in the United States is noteworthy.

The Russian educational system could adopt the American experience of engaging renowned representatives of science, industry, and the business elite to lecture and advise students on research projects. This will help students understand regional challenges, the state of scientific schools and specific enterprises, teach them how to work on projects and open-ended problems, and teach them how to work in an interprofessional team.

One of the strengths of American innovation education is the teaching of the fundamentals of innovation project management and innovative entrepreneurship: calculating the economics of a project, planning innovation management, and introducing the economics of invention. Of course, economics courses are also offered in Russian higher education. However, the economics courses taught to future researchers and engineers typically have a general economic focus. A significant drawback is that these economics courses are not focused on preparing students majoring in the natural sciences or engineering for real-world innovation: analyzing and addressing regional, Russian, and global market needs, understanding the entrepreneurial foundations of invention, and the challenges of creating and managing small innovative enterprises. These topics have been

thoroughly explored by American professors, and the corresponding courses and programs are competitive in the global educational market.

3. Conclusion

Summarizing the above, it can be concluded that the most appropriate approach would be to borrow certain elements of the American experience in the development of innovative education, which would increase the effectiveness of training without being too complex to adopt and without contradicting the modern concept (system) of education in Russia. It is worth noting here that, judging by many indicators, the existing system of higher education in Russia will undergo a consistent transformation, taking into account the analysis of its current state ^[12]. It is highly likely that the Russian educational space will be created as an independent structure in the global educational services market, against the backdrop of fierce competition with European, Anglo-Saxon, Japanese, and other educational models, with a clear predominance of the technocratic approach and an increasing dependence of education on financial-economic, socio-political, and mental-psychological dominants ^[12]. The formation of an independent educational system also correlates with geopolitical changes in the modern world. Nevertheless, it is worth noting that promising components of the American experience include:

1. The inclusion of a series of specialized courses on creativity in university curricula. These courses could be methodically distributed evenly across all years of study, complementing lectures and practical classes with increasingly complex professional assignments. A series of such courses would foster students' creative approach to work, as well as the development of an interdisciplinary knowledge system;

2. The active involvement of leading researchers, managers and owners of industrial enterprises, successful start-ups and spin-off companies, and successful entrepreneurs in lecturing and consulting with students during their research projects. American universities actively engage them in developing customized courses. It is possible to complete a collective research project at an industrial enterprise in a city or region, solving innovative problems facing the enterprise. A significant element of American education

is the internship of students at leading corporations in the US and around the world. Typically, the training includes the development of a large number of algorithms for solving practical cases;

3. Innovation management training programs place significant emphasis on teamwork and the development of team spirit. Nearly all courses in American universities on innovation education are designed with teamwork or games playing a central role. A significant part of innovation education is the development of team-based decision-making algorithms. Team-based algorithms are characterized by the practice of "brainstorming" at various stages of problem solving. They are typically used to develop segmented solutions and merge them into a single, unified solution.

4. Mastering the methodology of innovation and creativity. A significant part of training in innovation programs is training in systems analysis and a systems approach to solving any problem. Solving virtually any problem involves stages of developing possible system responses to changing parameters during the implementation of the solution. Periodic switching from an analytical work algorithm to synthesis is also a characteristic feature of decision-making practice. Teaching how to easily transition from synthesis to analysis, and through it to a new synthesis, is a common form of practical training.

5. Teaching students innovative activities within the framework of innovative projects, relying on interdisciplinarity and team collaboration. Some studies^[5-6] conclude that innovation management programs are always fundamentally interdisciplinary. Interdisciplinarity is practically expressed through scientific and experimental work, further developed through specialized courses and training, and by encouraging both students and full-time researchers to obtain additional advanced degrees in related sciences, disciplines, and interdisciplinary fields.

6. Incorporating courses on innovation project management and entrepreneurship into the training system for future researchers and engineers. It is possible, as is done in American universities, to widely allow students to independently formulate the topic of their thesis, taking into account the degree of success in their studies and participation in projects.

Given Russian realities, it can be argued that only the state can organize and primarily finance innovation

management training in today's Russia. Given the current situation, there is virtually no chance for the "natural maturation" of innovation management schools in the Russian higher education system. Only the state's political and organizational will, backed by resources and a position as an intermediary in establishing contacts between universities and corporate clients, can take the situation to a new level of development—a path traditional for Russia.

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