

# Educational Challenges of the Economy of Knowledge

Urazova N.

Department of Management of Industrial Enterprises  
Irkutsk National Research Technical University  
Irkutsk, Russia  
urazova\_nina@mail.ru

Kuklina M.

Department of Management of Industrial Enterprises  
Irkutsk National Research Technical University  
Irkutsk, Russia  
kuklina-kmv@yandex.ru

Starkov R.

Department of Management  
Irkutsk National Research Technical University  
Irkutsk, Russia  
1955starkov@mail.ru

Galtaeva A.

Undergraduate group EEM-18-1  
Irkutsk National Research Technical University  
Irkutsk, Russia  
ayakogr@gmail.com

**Abstract** – The article is devoted to the formation of an approach to modern education in the conditions of the "new" economy - the "housekeeper of knowledge", which provides the use of "change management" to improve the efficiency of an organization. Particular attention is paid to the analysis of modern education formats that are relevant in the context of the knowledge economy, as well as areas of improvement of Russian university education. The educational formats are considered. The attention is paid to their characteristic features, features and conditions of use. The existing educational format of modern Russian education and the main features of "free education" model, which is used in leading Western universities, are critically analyzed. In the framework of the latter model, the options of an open curriculum, a system of distribution requirements and the so-called "nuclear program" are considered. The possibilities of introducing them in modern Russian realities are investigated.

**Keywords** – *knowledge economy, change management, mass education, education pipe model, free education model*

## I. INTRODUCTION

The modern world is unthinkable without the achievements of scientific and technological progress and innovation. At present, the Russian economy has reached a new level of foreign economic relations, which is characterized by the active integration of country into global economic system. The need to modernize the economy on the basis of the achievements of the scientific and technical program, to activate innovative and investment business activities and to train qualified personnel in the field of management has responded to the challenges of our time.

However, today, the system and structure of Russian education does not meet the requirements of modern economic realities. There is a significant gap in the level of training in the country. Large metropolitan universities, preserving and multiplying the potential of Soviet science, are reaching the world level; regional science and education are degrading, unable to withstand competition. For universities at the regional

level, the problems of attracting applicants, the concentration of research and teaching staff, and the development of promising research areas have become more acute. They are characterized by a gap between ambitions: to enter the elite of Russian and even world education and the reality of a low level of research and training.

At the same time, ambitions have quite reasonable historical background. Many educational institutions were established in the first half of the 20<sup>th</sup> century as the centers for engineering personnel training for solving the problems of the industrialization of the country, and powerful scientific schools were created that were noticeable at the country level. The natural desire to get into the elite of universities in order to get the best resources and the best students is hampered by the existing position.

The implemented country development strategy influences the formation of the education system. Therefore the role of the new paradigm should be noticeable in its development. At the same time, it is obvious that the knowledge-based economy dominates in the countries of the technological core, which formed certain requirements for the education system, and the basis for modern success was laid in the mid-50s of the 20<sup>th</sup> century [1].

In this period in developed countries the prerequisites began to form for the formation and development of a new concept of economic development. The new, post-industrial stage of development of society and the corresponding type of economy is based on a person with his knowledge and skills, information, high technology, and innovation. The tool and the result of the formation of the "new economy" should be a change in the qualitative characteristics of development, first and foremost a transition from the raw material model of the development of the country to an innovative one. For this, production needs technical and technological innovations, new business models, information and management systems. The main thing for an innovation-based society is the innovative behavior and thinking of citizens who are supposed to live and work in new

conditions. Thus, this direction of social development should be based on the ever-increasing role of higher education.

Since 1945 in developed countries there has been a huge leap in the development and change of social conditions. It is caused by the “revolution” sweeping the whole world in science and technology, in economics and politics, in demography and social conditions.

However, the scientific and technological revolution, accelerating social processes, could not involve the education system in the process of changes. As a result, there is a gap between the requirements of society and the possibilities of education. [2, 3]

One can cite three confirmations of a high degree of crisis in education.

1. In the last decades of the 20<sup>th</sup> (from about the mid-1980s), an integrative indicator, the human development index (HDI), which takes into account not only the level of education, but also the expected duration, is used to determine the humanitarian state and possibilities of the socio-economic development of countries: life and real gross domestic product per capita. [4] This indicator in our country is steadily falling. The fall was especially evident in the 1990s, when in 1992 according to HDI indicators (0.849) Russia ranked 52 out of 174 countries surveyed, then ten years later it was 119, which was associated with a significant reduction in life expectancy and real gross domestic product per capita and lower education rates [5].

2. The specialists from UNESCO and the World Health Organization, whose experts examined the problem of the viability of various nations and states, came to one more conclusion. In the assessment on a five-point scale, no one received the highest score. The viability of Belgium, Holland, Iceland, Denmark and Sweden was evaluated by four. The United States, Japan, Germany and many other industrialized countries received three points each. As for Russia, its viability is only 1.4 points - the level below which the irreversible degradation of the country can begin. [6] Of course, it is obvious that this assessment is too pessimistic, but, nevertheless, the processes taking place in Russia at the end of the 20<sup>th</sup> century can not be called positive.

3. The financial policy in relation to the social sphere and education in particular directly threatened the national security of the country. According to the World Bank, the share of expenditure on education in gross domestic product in the USSR in 1970 was 7%, in Russia in 1994 it was 3.4%, i.e. reduced by more than half. Moreover, if in the 80s the reduction was slow and gradual, then in the 90s it acquired a landslide character. For comparison, the share of expenditure on education in the United States, France and Great Britain ranges from 5.3 to 5.5% of GDP. [7]

Thus, in Russia, the crisis of education has grown to the level of national security; it determines economic, military, technological security, which is impossible without qualified personnel, high technologies and modern scientific developments. The countries of the technological core were not only able to overcome the crisis of the changing economic

paradigm, but were also able to build effective education systems.

The authors consider the unique experience of the American higher education system [7], the prestige of which in the world is extremely high. It is necessary to note that the scientific potential of universities is assessed according to several criteria: publications in significant journals (Science, Nature), citation of scientific works by other scientists, the number of Nobel, Field-like and other awards associated with a university. In most international university competitiveness ratings, these factors constitute the largest share.

For this reason, prominent American universities such as Harvard, Stanford, Massachusetts Technological and other well-known universities are usually located at the top of all rankings. During their history, they have released a significant number of Nobel laureates and packs of revolutionary articles, conducted millions of important studies, which in turn attracted other brilliant scientists and students. This leadership was not formed in recent years.

Already around 1960–1970s, various educational programs began to pay attention to change management, the essence of which comes down to the understanding that large-scale strategic organizational changes are an indispensable condition for business success.

The ability of an organization to change was considered as a key factor in its competitiveness in the long term. The most effective in the future will be those companies whose specialists are able to quickly and efficiently carry out fundamental, long-term transformations that completely transform business processes.

## II. PROBLEM STATEMENT

Currently, educational programs in this area exist in many leading American universities (meaning educational innovation management programs, or including significant segments of it in their educational plans) and business schools, representing, for the most part, an elite group of American higher education and intermediate level universities. For example, the entrepreneurship and innovation program at the Sloan School of Management at the Massachusetts Institute of Technology, Harvard Business School at Harvard University, and Institute for Decision Making Science at Columbia University and many others.

The predominant role of academic centers in teaching innovation management in the United States is associated with a significant integration of university education in a market economy, which undoubtedly reflects the direction in which Russia must move. The role of the university as the main source of innovation and new knowledge is unquestionably recognized by the business community in the United States. Only such state structures as military departments can compete with universities in this area, but access to their R & D of the majority of the corporate community is closed or difficult. Characteristic features of the new business education are the following.

First of all, training programs for innovation management are always fundamentally interdisciplinary. The principle of interdisciplinarity is built into a cult in technological innovation centers, similar to the School of Engineering and Applied Sciences at Harvard University, where they are actually trying to create a new, devoid of disciplinary partitions science and an advanced cell of the knowledge society, consisting of the producers of this knowledge [8].

Secondly, an important component of educational programs is training in systems analysis and systems approach in solving professional problems. The solution of virtually any task includes the stages of working out possible system responses to changing parameters when the solution is put into practice.

Thirdly, the study of the management of innovation and change, as a rule, requires intensive communication between teachers and students, and between students themselves in the implementation of projects. This exchange of views, knowledge and decisions does not stop outside audiences.

Another characteristic feature of American innovation management programs is the involvement of business representatives who have a desire to teach, who, while not being professional teachers, nevertheless conduct separate courses at the respective universities.

### III. RESEARCH PROBLEM

Obviously, today our country can not claim significant participation in the “knowledge economy” for obvious reasons (GDP and export structure, the dominant technological structure), therefore, the trend of “massization” dominates in our education, which consists in attracting a significant number of applicants with average preparation.

At the same time, Russian society basically received “quasi-massization”, in the sense that there was no sharp increase in the number of students due to the demographic decline, and the society did not get any advantages from mass production, such as a massive influx of applicants and their funds, students and a decrease in the level of research of the CPD can be traced quite clearly. The “educational tube” model, dominant in the post-Soviet period, is relevant for the implementation of this trend. [9]

Historically, Russian universities were mostly educational institutions, and R & D was primarily engaged in the institutes of the Academy of Sciences system, but now the situation has changed. The university rating, its attractiveness (for society, state, corporations, students) depends on the research conducted. In addition, the level of scientific research conducted by a university is easily measurable compared to determining the quality of student training.

It is probably difficult to clearly divide modern educational institutions into research and educational ones, excluding from the latter any scientific formats (academic magistracy and postgraduate studies, dissertation councils, publication of scientific journals and collections, conducting scientific conferences) to combat imitation of research activities, but work on the revival of the norms of basic research protocol is extremely relevant.

Only strict adherence to the norms of the research protocol and professional standards will ensure that a university will improve the situation with post-bachelor education. According to the authors it is at the level of the organization of post-bachelor education where difficult problems arise in Russian universities.

Experience shows that heads of master programs and scientific and pedagogical workers implementing these programs have a vague idea of the essence and purpose of master programs. These formats are inorganic for Russian universities; they represent a segment from the “educational pipe” of a bachelor degree program. This often leads to their simulation implementation. The solution could be a clear separation of academic and applied magistracy.

In the case of the implementation of an academic magistracy program, it is important to clearly realize that the magistracy is the preparatory stage of the career of a research worker. Here it is necessary to update the norms of the basic research protocol. To some extent this applies to graduate school at a university.

Sometimes, the topics being developed by graduate students are not relevant even for Russian science, and the research being conducted is of too low quality (plagiarism, publications in “junk” journals). Nowadays a dissertation thesis, both in essence and in form, is only a qualification work, formally confirming the ability of a graduate student to perform scientific work. [10]

Applied master programs can focus on stakeholders and the needs of professional communities. It can be organized, for example, in the image of American vocational schools.

### IV. MATERIALS AND METHODS

The problems arising from the development of Russian education lead to the comparison of two educational models: the “educational tube” and “free education”. At the same time, the “educational tube” model, which dominates in the post-Soviet period, is relevant for the implementation of the above mentioned trend.

The proposed Table I clearly shows the obvious consequences of the applied educational model, which led to a decrease in the level of education in Russian universities.

The table shows the characteristics and consequences of the applied Russian educational pipe model. Despite the changes taking place in the society and in the education system, a significant transformation of this model has not yet taken place.

However, if the university seeks to get into the highest echelon of universities in the country, then the implementation of this model will significantly slow down its breakthrough, because staying in the elite corresponds to the opposite trend - the trend of “knowledge economy”, which is characterized by the rapid development of technology, short life cycle, the need for different competencies, a set of which is unpredictable in advance, etc.

**TABLE I. COMPARATIVE CHARACTERISTICS OF EDUCATIONAL MODELS<sup>a</sup>**

<i>Model features</i>	<i>Consequence of the model "Educational Pipe"</i>	<i>Model features "Free Education"</i>
Fixed set and sequence of training courses	The lack of competition for students of the NDP and the motivation to develop and improve their courses	Tough competition for the student, a dramatic improvement in the quality of the preparation of the NDP for classes. For a student, it is an opportunity to choose and take responsibility for your choice.
Training in one group for 4 years	Isolation of a student in a "closed space", limited opportunities for research communication (as "native" science), the lack of the possibility of creating an intellectual space and restricting interdisciplinary interaction	Immersion of a student in an "uncomfortable," that is, an unfamiliar environment for him, will expand his horizons, experience, and opportunities. Creation of intellectual student space
Low status of general education disciplines	Low level of students' culture, poor knowledge of the laws of development of science and society, lack of understanding of the logic of their development. Lack of prerequisites for the development of interdisciplinarity	The high status and level of general education disciplines is the basis of a good general education, the ability to "have a great conversation" and increase the overall culture of members of society, including the development of soft skills.
Traditional lecture - monologue	Weak student involvement in the educational process, lack of interest in studying, lack of interactivity - lack of incentives to search for information and gain knowledge on their own	The main technology of training is seminars. Interactive learning - an incentive for self-development, interest in learning, awareness of learning
Specialist training for a specific workplace	Predefined standard set of competencies	Ability to choose a profession not only once, but repeatedly. It is impossible to become a pro in an area that does not yet exist, but you can give skills that will enable you to independently obtain these competencies.
Head of the educational program is an employee of the university	Limited vision of the problems of professional communities, lack of reliable information about the labor market and market requirements for graduates. The prevalence of social norms and professional obligations	The head of the PLO is not a full-time employee of the university. Understanding the problems and prospects of the labor market, the absence of the need to comply with social norms to the detriment of professional

<sup>a</sup>. compiled by the authors using [9, 10].

## V. RESULTS AND DISCUSSION

The choice of "free education" format is possible, since it is he who will allow to level the shortcomings of the established system.

The authors consider the format of "free education" in more detail.

**TABLE II. "FREE EDUCATION" FORMATS**

<i>Format</i>	<i>Entity</i>	<i>Terms of sale</i>
Open syllabus	The space of disciplines in which the student chooses his or her educational trajectory.	Elite universities (including those from the Ivy League), the highest requirements for academic staff, who created the "discipline space", the high cost of training and high requirements for the preparation of applicants and take responsibility for your choice.
Distribution requirements system	There is no complete freedom in choosing courses, but there is also no "imposition" and a mandatory program.	Distribution "by latitude" (University of California at Berkeley) - a list of required areas from which the student is obliged to choose courses at will (the disadvantage is a fragmentary picture of science), then you can choose a specialization. Everyone has different educational trajectories. High requirements for CPD, in preparation for classes. There is a danger of reducing the motivation to learn, the choice of simple and "weak" courses. High cost of training.
Nuclear program	Predefined set of courses distributed over several areas, mandatory introductory part and specialization	It is implemented in the largest universities, including technological (MTI, Caltech, Chicago, Columbia universities); there is an element of coercion for gaining breadth of knowledge ("great texts" for "great conversation"), creating a single intellectual space for students and the NDP. Requires a certain cost to organize the educational process

<sup>b</sup>. \* compiled by the authors using [11]

The table shows that of the three proposed formats, the format of a "nuclear program" will be the most acceptable for many Russian universities. It is close to the modern bachelor's degree. It is implemented with the existing level of academic and teaching staff and applicants, it meets the challenge of increasing the graduate's general culture and its characteristics meet the challenges, opportunities and requirements of modern Russian education. In the future, the transition to a system of distribution requirements is expected.

The "open curriculum" program is very difficult to implement at the present stage of development of Russian education. As a rule, it is implemented by private educational institutions with a high cost of education, it requires the availability of world-class scientific and pedagogical workers and excellently trained students.

For students of the innovation management programs, a large number of pre-prepared courses have been developed, from which it is possible to build an educational program. Particular attention is paid to learning the ability to system thinking and analysis, strategy and tactics of teamwork and brainstorming [11].

Some educational programs, in addition to drawing up individual learning paths from already developed standard courses, are ready to create courses for a specific order - mainly for management teams, usually studying in such schools, in parallel with working in a corporation. At the same time, considerable attention is paid to the individual needs of a particular student. The educational "background" and the interests of each student are studied most carefully, and, as a result, each of them is offered an individual set of courses, trainings and practices [12].

As a result of the accumulation of a large number of such courses, such educational programs may, as a rule, offer a wide choice of training courses — much more extensive than when using other training formats. For innovative schools, due to their interdisciplinarity, a high rate of preparation of new courses is typical: on average, depending on the complexity of the task, this process takes from 2 to 4 weeks. [13]

## VI. CONCLUSION

Naturally, many leading Russian universities are extremely interested in the development of such an education system. It is they who especially need elite education zones as a tool and method of self-development of a university. This will make it possible to attract the best applicants, funds, the best scientific and pedagogical workers (SPW), interest stakeholders, form interdisciplinary areas.

Disciplines play an important role in a university, they realize three main functions: first, through them the scientific and cognitive prestige of the scientific and pedagogical workers and the university itself is transmitted to the external environment. Moreover, this prestige is ensured only by disciplines in which the scientific and pedagogical staff of this university is strong. Secondly, they reflect the compliance of the work of the SPW with professional standards through the participation of the SPW in disciplinary communities. Thirdly, they reflect the structure of a university - departments, institutes. When the structure of a university changes, when the load changes, when changes are initiated by the government, stakeholders or other external environment, a department reacts by consolidating and strengthening social ties, and appeals to the violation of professional or disciplinary norms. [14]

One of the ways to improve the efficiency of a university is to introduce elements of free education in the format of a distribution requirement system, which will dramatically increase the competitive environment and identify outsiders. Another solution to the problem of increasing the effectiveness of ineffective disciplinary areas may be the development of interdisciplinarity that is, in fact, provides them with new incentives and opportunities. The work on improving the

disciplinary structure at a university should also address the following aspects: maintaining the relevance and trends of world science, increasing the influence of disciplinary communities outside a university on the academic staff of a university, the infusion of "fresh blood" - i.e. the fight against inbreeding and the development of inter-university cooperation, the allocation of resources on a competitive basis.

In order to increase the attractiveness of a university in the eyes of all its stakeholders (student, corporation, state), society as a whole and the scientific world, it is not enough to rebrand a university [15], declaring the "new era", it is necessary to change it from the inside.

It is necessary to understand what constitutes an institution of higher education, what values its scientific and pedagogical workers realize and honor, what subcultures dominate in them, what is their true attitude to the research protocol, what is the vision of future university for employees and administration.

In order to transform the values of its employees, many aspects of the activity should be changed: the approaches to educational programs, the attitudes toward the research protocol and others, assuming that the values of employees will change through the processes of self-knowledge and rethinking.

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