High education and human resources in the Russian Arctic region: problems and particular qualities of development

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Abstract. The article presents a description of the history of high education development in the Arctic zone of the Russian Federation, provides an overview of the priority areas of popular professions for the region as a whole, and for its individual subjects; analyzes the main indicators that determine the opportunities for training in higher education institutions and identifies the distinctive features of the functioning of higher education in the Arctic region. A number of recommendations are proposed for certain areas of improving the system of training in higher education institutions of the studied region, taking into account its geographical location.

1. Introduction

Low population density, long distances between localities, extreme living conditions, underdeveloped infrastructure and remoteness from the country's economic centers determine not only the specifics of economic activity, but also the features of the educational system functioning in the Arctic part of our country. This article is not about the availability of the secondary school education, which is certainly important, but about the opportunities and existing objective complexities of the high education system.

In Soviet period, the development of the Arctic zone was one of the priority and successful direction, which could be possible as a result of joint scientific research, education and economic development of the region, carried out both within the framework of the state task and incentive migration, and forced migration. This is not only a time of expeditions and new discoveries, but also a time of grandiose construction of network the polar stations, settlements that were built from scratch in extremely difficult geological conditions, communication lines and transport routes, which would not have been possible without high-quality training of geologists, meteorologists, engineers, oilmen and many other specialists.

This approach made possible not only the development of resources, but also the formation of the socio-economic image of the territories. In the framework of the state policy of the USSR the development of the North is assumed large-scale development of the forest industry to ensure deficit in forest products of European part and Central Asia region of Soviet Union; mining industry on the Kola Peninsula, in the basins of the Kolyma, Indigirka, Aldan, Yana; construction of river ports used for the export of mineral raw materials and for delivery of general cargo [1] and railways in the European North.

Educational process and training for the Arctic region in the Soviet Union had place in the military academies and scientific research institutes (North Scientific Resource Expedition - future Arctic And Antarctic Research Institute), specialized high school institutions (Leningrad and Odessa hydro meteorological institutes), Moscow, Voronezh, Far East (Vladivostok), Irkutsk, Kazan, Kiev, Perm,
Saratov, Tomsk, Kazakh (Alma-Ata), Tashkent, Tbilisi universities, and the Makarov Arctic Leningrad High Engineering Marine School [3], Leningrad Shipbuilding Institute, Leningrad Institute of Water Transport Engineers, Leningrad Mining Institute). The list can be supplemented with universities and technical colleges in the capitals of the administrative units of the Arctic zone regions and not only [5]. However, Leningrad was the undisputed leader in the number of educational institutions and training profiles for work and research in the difficult conditions of the Far North, including the training of teachers for primary and secondary schools in the North regions [2].

Irreversible political changes in the late 80's in the Soviet Union affected the Arctic zone sharply, affecting almost all areas of economic activity (especially the defense industry and research activities), which led to not only an increase in unemployment, but also a massive outflow of population from the Northern territories [8]. Of course, people left the Northern territories earlier, but at the same time there was an influx of new specialists and young families. The beginning of the 1990s was critical for the Arctic – the population has decreased from 9.4 million people since 1989 to 2.37 million people in 2017 – that is, almost three times [7]!

New political realities have led to the dominance of the shift method of developing natural resources, primarily in the North-Eastern regions. As a result, there was a rapid decline in the permanent population, especially in the "Old" centers of industrialization. The decrease in the permanent population has led to a decrease in the number of educational institutions that train specialists in the industries represented.

The "geopolitical turn" of the Russian government towards the reincarnation of Russian Arctic and new trends in the country's socio-economic development has intensified discussions at various levels of the education system in the region. These discussions address issues such as the quality of education, areas of research, the potential of the indigenous population to develop economic activities, and the possibility of increasing labor productivity.

Both employers, representatives of universities, and scientists agree that training for working in the Arctic territories is different from training for working in other regions, since future specialists must have a number of universal – supra – professional-skills [12]. This is not only extreme living conditions in terms of climate, but also the lack of logistics, year-round transport links for some areas, and the inability to obtain health and education services.

2. Main part

In 2017, an integrated list of the most popular professions (130 vacancies) was created for all subjects of the Russian Arctic. More than 300,000 vacancies in more than 2.3 thousand professions were submitted to the state bodies of the employment service of the population of eight Arctic regions [10]. From this set of professions for each region, the most popular professions were selected, which form half of all vacancies in the region's labor market.

It can be stated that most of the vacancies were applied for engineering specialties in the mining, oil and gas production, transport, and construction industries.

Agriculture and fishing play an important role in the development of the economic complex of the region. Management of the specific biological resources of the territory is especially important in recent years. Among the most popular professions are: veterinarian, zoo technician, reindeer herder, hydrobiologist, fisherman, fish handler, accountant, electric and gas welder, cook, etc. For the social sphere - doctors of various specializations, nurses, teachers, kindergarten teachers are required. Some differences among the required vacancies related to the specifics of specializations can be identified by individual subjects of the region (table 1).

Table 1. Economic potential and human resources needs of some subjects of the Arctic zone of the Russian Federation
Region | Priority directions of economic development | Popular jobs openings
--- | --- | ---
The Murmansk region | The territory is home to the largest ice-free seaport and fishing industry | Professions related to navigation, ship repair, production and processing of fish
Yamalo-Nenets and Nenets Autonomous district | Oil production, construction, transport and communications | Oil and gas operator, driller, rig driver, and a wide range of construction industry professions.
Chukotka and Nenets Autonomous Okrug, Yakutia | Reindeer husbandry | Reindeer herders and veterinarians
Arkhangelsk region | Shipbuilding, including the construction of nuclear submarines, ships, vessels of various classes and ship repair | Ship fitters-installers, assemblers-builders, pipeliners
The Republic of Sakha (Yakutia) | Mining and production of diamonds | Diamond markers, diamond cutters

Compiled by the authors according to [10]

Based on the results of the list, it can be noted that there is currently a revival of interest in working professions in the Arctic zone of Russia, whose share in the final list is 70-80%.

To train personnel in the study region, there are both its own database of educational institutions and programs for attracting highly qualified specialists from other regions of our country. More than 20 high education institutions operate in the Arctic zone of the Russian Federation (table 2).

**Table 2.** List of educational institutions of high education located in the Arctic zone of the Russian Federation for 2018

| The subject of the Russian Federation | Educational institutions |
| --- | --- |
| Archangelsk region | 1. Arctic Maritime Institute named after V.I. Voronin - branch of State University of the Sea and River Fleet named after Admiral S.O. Makarov 2. Northern (Arctic) Federal University named after M.V. Lomonosov 3. Northern (Arctic) Federal University named after M.V. Lomonosov (branch in Severodvinsk) 4. Northern State Medical University of the Ministry of Health of the Russian Federation 5. Institute of Management 6. Northern Institute of Entrepreneurship |
| Krasnoyarsk region | 1. Norilsk Industrial Institute 2. Leningrad State University named after A.S Pushkin (Polar Division) |
| Murmansk region | 1. Murmansk Arctic State University |
The leaders in the number of universities are Murmansk and Arkhangelsk regions. In all subjects, technical and economic areas are prioritized.

The structure of training in the Arctic zone of the Russian Federation stands out for its own characteristics. The region has significantly more than the national average, the number of students enrolled in training programs for skilled workers (per 10,000 people). The number of students studying undergraduate, specialty, and master’s programs in the Arctic zone is much lower than other subjects of the Russian Federation. If in 2018 the national average was 289 students per 10,000 people. The population studying at universities, in the Arctic regions, the closest to the average level was characteristic only for the Krasnoyarsk Territory - 267 people. In Chukotka Autonomous Okrug this indicator was 8 times less than the average Russian one, in the Yamalo-Nenets Autonomous Okrug - 16 times less. There are no higher educational institutions in the Nenets Autonomous Okrug (table 3).

**Table 3.** Number of students enrolled in training programs for skilled workers, office workers, middle managers, and in undergraduate programs, programs of specialists, and master's programs in the Arctic regions of Russia in the 2017/18 academic year (per 10,000 people)

| Region                                | Number of students enrolled in |
|---------------------------------------|--------------------------------|
| Komi Republic                         |                                |
| 1. Ukhta State Technical University (branch in Vorkuta) |                                |
| Chukotka Autonomous Okrug             |                                |
| 1. Chukotka branch of the North-Eastern Federal University named after M.K. Ammosov |                                |
| Yamal-Nenets Autonomous Okrug         |                                |
| 1. Noyabrsk Institute of Oil and Gas, a branch of the Tyumen Industrial University |                                |

Compiled by the authors according to [6]
training programs for skilled workers, office workers, middle managers | undergraduate programs, programs of specialists, and master's programs
---|---
RUSSIAN FEDERATION | 38 | 289
Republic of Karelia | 45 | 187
Komi Republic | 59 | 195
Arhangelsk region | 69 | 164
Including: | | |
Nenets Autonomous Okrug | 63 | |
Murmansk region | 40 | 117
Yamal-Nenets Autonomous Okrug | 36 | 18
Krasnoyarsk region | 56 | 267
The Republic of Sakha (Yakutia) | 56 | 248
Chukotka Autonomous Okrug | 10 | 35

Compiled by the authors according to [4]

In addition to training professional personnel, the development of a scientific direction is also actual in the Arctic region. Annually, graduate students and doctoral students are admitted and graduated from universities, which indicates the creation of conditions for the preparation of teaching staff for teaching at universities, as well as employees for work in scientific organizations (table 4).

**Table 4. Key indicators for training in higher education institutions in the Arctic zone of the Russian Federation for 2018**

| Arcti c zone of the Russian Federati on | Admission to postgraduate programs in the reporting year, person | Graduation from the postgraduate programs in the reporting year, persons | Graduation from the postgraduate programs with the defense of the dissertation in the reporting year, persons | The number of postgraduate students at the end of the year, persons | Number of organizations having postgraduate programs, units | Admission to doctoral studies programs in the reporting year, persons | Graduation from doctoral studies programs in the reporting year, persons | Graduation from the doctoral program with the defense of the dissertation in the reporting year, person | The number of doctoral programs students at the end of the year, persons | Number of organizations with doctoral degrees programs, units |
---|---|---|---|---|---|---|---|---|---|---|---|
Arctic zone of the Russian Federation | 178 | 111 | 4 | 643 | 10 | 3 | 3 | - | 5 | 2 |
Among the necessary measures for the further development of professional competence of students and graduates, the following can be distinguished:

* Opening the "Arctic" departments or faculties in universities "on the mainland of Russia", both regional and metropolitan, the training of specialists for work in the Far North of Russia;
  * Creation and implementation of career guidance programs for doing business in the Far North. These may be specialized economic classes similar to the technical classes of Norilsk Nickel in Krasnoyarsk;
  * Conducting in the universities of the Arctic in the field of youth business schools;
* The introduction of new learning models in the form of practical additions to theoretical programs;
* Organization and implementation of production practices at enterprises engaged in economic activities in the Russian Federation [11].

The priority of the development of scientific activity in the region can be defined as its practical significance. Research needs to be promoted in the Arctic municipalities, not remotely in Moscow and other cities.

There are already practical steps to develop the scientific and educational environment in the Arctic. So, in June 2016, in Arkhangelsk, on the basis of the Northern (Arctic) Federal University, a historic event took place - the signing of an agreement on the creation of the National Arctic Scientific and Educational Consortium, which included 14 participants [11].

3. Conclusions

Despite the growing interest in the Arctic, the development of development strategies and many scientific events that have already taken place and are planned, we would like to emphasize the difficulties in creating a new education system for the Arctic.

3.1. *Impossibility of the quality education without interactivity with employers in the context of professional requirements*

This system is being formed very slowly, because at various conferences, congresses and reports on the strategy for the development of education in the Arctic there are a lot of statements about cooperation, but not enough practical measures to implement them. Of course, there are universities that have returned to the training system, which involves the practice of students in an enterprise with the subsequent conclusion of an agreement. But there are few such universities. But this is not the only problem. We are talking about the fact that employers do not participate in the formation of curricula, filling educational programs, including practical ones. High education institutions often form directions in terms of attractiveness, “fashionable” names of disciplines, not based on the real requirements of the economy.

3.2. *Quality of education*

There has been enough discussions about the decline in the quality of student training in recent years and there are many reasons for this. But here we are focusing on state priorities and the specifics of the formed competencies. It is possible to look at the quality of training from two sides. The first is often the absence of specialists precisely in training in certain areas of knowledge. Having a degree and work experience at a university will not form the required skills. It is, of course, about practice-oriented disciplines. In this case, we focus on disciplines that are relevant to practical application. In higher education institutions, there are not enough specialists from the business sector who have theoretical skills in teaching disciplines. New equipment and modern communication systems are also needed to
create a more comfortable learning environment. International cooperation is necessary in the development of the scientific sphere. The second side of the problem is related to the fact that in pursuit of statistics on the number of budget places for training, the number of students expelled, according to various ratings, educational institutions are forced to underestimate the requirements for knowledge. That is, often, the level of engineer, meteorologist, and forestry specialist trained in the years of the USSR is at the initial level higher than a graduate of modern universities. And this problem is very multifaceted and will manifest itself in a few years.

3.3. Legal aspect of companies’ participation
In the Soviet period of the development of the Arctic, the socio-economic incentives of labor migrations to the Far North were clearly implemented (wage increases were such that the “northern money” went from different parts of the country, while current wages do not correspond to market prices in these regions; educational and medical institutions in which teachers and doctors could provide the same level of training and assistance as in many other regions of the country). This situation consisted of the existing plan for the development of territories (including the construction of cities and towns, the laying of power lines, the functioning of military bases), the high requirements and responsibilities at all levels of government (we do not deny that there were certain violations in the sectors or insufficient productivity, etc., we emphasize the general trend). Of great importance for the formation of the socio-economic and cultural image of the North was the system of distribution of university graduates - that is, teachers and doctors with a high level of training worked here (and not only here), and not those who have nowhere to go, who have primary education in profile, since there is simply no way to improve skills. The state should interest companies in taking students to practice, investing in certain projects, and now in reality companies are looking for employees with the characteristics they need on their own, which takes a lot of time.

3.4. Location of educational institutions
In the USSR, on the one hand, there was high-quality training in different parts of the country, including in the Arctic profile, but there was clearly a concentration of various universities, colleges, and research institutes in St. Petersburg, which is due to the historical reasons for the development of research activities in the first place. The system of distribution of graduates and the highest level of motivation did not need to change the geography. In modern economic and political conditions, it is very difficult to assume that students studying in St. Petersburg will show a true interest in working in the Arctic region. Perhaps, with the exception of those who are "sick" of the North", who deliberately went to enter certain areas, but even among them there are those who want to go to Sweden, Norway, Canada and beyond, explaining that I was not interested in the country, I was offered more opportunities abroad, etc. And this is the sphere of Patriotic education, support for young people, and a fair course of the state in determining the rights and guarantees of the population. It should also be added that a lot of students go to St. Petersburg in the target areas of training from Arkhangelsk or Komi. Why? Question of absence of educational institutions in other regions? Incorrect allocation of budget funds? Inconsistency of actions of the government, business structures and universities? There is no clear answer, but there is a problem.

3.5. Scientific research activities
The development of the Arctic is impossible without scientific research in various fields, testing and often painstaking Desk work after field research. The issue is that the system for allocating funds for scientific research is closed. The choice of topics for proposed projects is often not related to economic requirements. Projects from small cities and small institutions have much less chance of being implemented. Publishing of the results of some serious scientific research is expressed in the publication of a collective monograph for University statistics and is not related to the implementation of ideas. Databases for research in our country are closed. Perhaps the requirements for scientific research should be stricter and necessarily include cooperation with companies?
All of these issues are important and cannot be fully disclosed in this publication. But without a critical approach and understanding of the problems, it is impossible to create a new educational environment of New Arctic of New Russia.

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