

The Personnel Support Program of Oil Fields Development Projects: An Informational Approach

¹Tatyana Veynbender and ²Svetlana Vershinina

¹Institute of Management and Business, Tyumen State Oil and Gas University,
38 Volodarskogo St., Tyumen, Russian Federation

²Institute of Mathematics and Computer Science, Tyumen State University,
8a Osipenko St., Tyumen, Russian Federation

Abstract: The study presents the rating of the Russian universities where specialists of oil and gas branch are trained; considers the main programs of dynamic modeling, options of the problem solution of training personnel by means of new information technologies. The scheme of cost calculation of works on a course development is offered; the analysis of the principles of the advance education and the social order is carried out; results of sociological research on a question of need and significance of personnel support of petroleum and geological education are presented.

Key words: The advance education in system of personnel support, the advance social order, petroleum and geological education, the Russian universities, Petrel (Schlumberger), Irap RMS (ROXAR), Surfer, Tigress, GOCAD, Strata Model (Landmark), the OS/2 Warp Connect 4, Visual Age for Java 3.5 Operating System, the program of personnel support, sociological research, the draft decision of an educational task

INTRODUCTION

The Russian oil business is in a stage of gain in experience of exploration projects implementation, development and exploitation of oil fields in new undeveloped regions of the Arctic continental shelf. At the moment there is a huge need for highly qualified specialists of these directions, especially significant field is a direction of shelf drilling and geology. The matter needs to be considered both from a position of the state and at the regional level. Any young person wishing to enter the university for prestigious oil and gas specialty has to have idea of methods and technologies to use to be able to increase the educational level. In general, the education system accepted in the Russian Federation is in a reforming stage which purpose is acquisition of essentially new qualities by graduates meeting the demands of modern society.

MAIN PART

The analysis of the principles of the advance education of personnel support: A model of the advance education aimed at formation and development of competences of professions which only appear in the Russian

market is of high priority. The aim of the advance education is to train highly qualified specialists for work in information-intensive world having the abilities to accept and model strategically important administrative decisions rather quickly. The advance education focuses young people on understanding of the professional knowledge simulated by subjects of training. Realization of the principles and idea of the advance education assumes also change of character of contents statement of traditional training courses. They have to contain much more data on tendencies of development of this or that area of scientific knowledge and also on its links with other perspective directions of development of science and practice which will be the most relevant in the near future (Glebov, 2006).

The basic principles of the advance development of the personality: Principle of a professional universal education. This principle will completely be coordinated with model of continuous education which is applied in oil and gas branch at present. The system assumes introduction of multilevel and multidiscipline systems of professional post-degree education.

Principle of personality self-development. Realization of the principle of self-development of intellectual,

willed, emotional and sensomotor spheres of trainees' individuality has to take place on all education levels, including the postdegree education.

The principle of the advance social order means forecasting, formation and the advance satisfaction of future needs of society for vocational training of personnel that is very relevant in oil and gas education in relation to development of the Arctic Region (Zakrevsky, 2009). It is necessary to figure out and consider the principle of the regional social order.

Professional educational institutions create workplaces for graduates in their structure according to professions challenging for the region. Establishment of rational proportions in training personnel for regions that attracts revision of the available education systems and attraction of innovative methods of training (Kanevskaya, 2012).

The principle of structural balance of educational programs proves providing the general (in country scales in general and in regional aspect of consideration) balanced qualification structure of professional educational programs for levels and branches taking into account the forecast of not only demographic situation but also the demand for the new professions connected with development of new regions in Russia.

The principle of the advance forming manufacturing requirements level of professional education of the population has to be based on forecasting, formation and satisfaction of future needs of production for vocational training of personnel. The priority in training personnel is given to hi-tech production taking into account critical technologies and the directions of technological break. Preliminary personnel training for the developing global network production, trade and other structures is a priority in personnel training for high-tech industries.

To cope with a problem of specialists' training from a position of the advance education many Russian Oil and Gas Universities such as Ufa State Oil Technical University (UGNTU), Tyumen State Oil and Gas University (TSOGU) and Ukhta State Technical University (UGTU) declared commitment for association and cooperation for joint implementation of the program of development of new oil and gas fields (personnel aspect) projects support. The purposes and problems of such cooperation are presented in the program of development of TSOGU for the period till 2018.

TSOGU is a Research University and together with partners is intended by 2018 to meet completely the demand of the oil and gas enterprises for the trained staff who will be able to work in difficult conditions of Far North.

At present the updated Russian legislative framework concerning oil and gas branch has the purpose to develop algorithm of "assistance" in realization of a number of strategically important large projects by 2030. It is supposed that many large Russian and foreign corporations and also a large number of small firms will be involved in these projects (first of all as contractors and subcontractors).

In our opinion, in such large and complex projects systems of object-oriented forms and methods of management of oil and gas production can be applied. In structure of any megaproject the following participants are involved:

- The state acts as the customer. Therefore, the megaprojects relevant to development of the Arctic region directly are connected with strategic priorities of economy development of the Russian Federation till 2030
- The attracted investors acting both from the state and from private corporations. The mechanism of receiving profit is a main objective at this stage
- Administrative personnel of this megaproject. At this stage there are challenging personnel affairs
- General contractor (large company)
- Subcontractors (representatives of medium business)
- Main financial instrument-financial group (bank)
- Direct owner and/or landowner of the land property (field)
- Federal level authority which is authorized to grant the license for subsurface use of the company
- Firms the producers acting as suppliers of the equipment and materials
- Universities of the country being suppliers of modern qualified personnel
- Engineers-managers, technicians and personnel
- Companies of oil and gas branch
- The auditors' firms, firms acting as consultants and experts in technical and financial affairs

Any life cycle of the project includes three stages: initial, pre-investment, the main, investment and working stage, an operation stage.

On each of above mentioned stages the complex of geological exploration and other works is conducted. It isn't dependent on an orientation of works and a stage of life cycle of the megaproject. Each oil and gas project assumes formation of a state order of the Ministry of Energy of the Russian Federation for the leading higher educational institutions on complex preparation and retraining of administrative and engineering personnel. On the other hand implementation of any project assumes

Table 1: The higher educational institutions training specialists of oil branch (fragment)

α -league (alphabetically) (1)	β -league (alphabetically) (2)	γ -league (alphabetically) (3)
Voronezh State Technical University (VSTU)	Altai State Technical University named after I.I. Polzunov (AltSTU)	Altai State Agricultural University the Altai SAU
Higher School of Economics National Research University (Moscow)	Volgograd State Technical University (VolSTU)	Volgograd State Agricultural Academy Volgan
Irkutsk National Research Technical University (INRTU)	Voronezh State University of Engineering Technologies (VSUET)	Volgograd State Architectural and Construction University (VolsACU)
Kaliningrad State Technical University (KSTU)	Ivanovo State Power University (ISPU)	Vologda State Technical University (VoSU)
Moscow State Construction University (NRU MSCU)	Kemerovo Technological Institute of Food Industry (KemTIFI)	Voronezh State Architectural and Construction University (VSACU)
Moscow State Technical University named after N.E. Bauman (MSTU)	Kuban State Technological University (KubSTU)	Voronezh State University (VSU)
Lomonosov Moscow State University (MSU)	Moscow Automobile and Road Institute (state technical university) (MARI)	Financial University under the Government of the Russian Federation (Moscow) (FUGRF)
Moscow State University of Food Productions (MSUFP)	Moscow State Institute of Steel and Alloys (technological university) (MSISA)	Vyatka State University (VyatSU)
Nizhny Novgorod State Technical University (NNSTU)	Moscow State University of Press (MSUP)	Moscow State Institute of International Relations (university)
Orenburg State University (OSU)	Moscow State University of Applied Biotechnology (MSUAB)	Nizhny Novgorod State Architectural and Construction University (NNSACU)
Perm State Technical University (PSTU)	Moscow State University of Railway Engineering (MSURE)	Samara State Space University (SSSU)
Perm State University named after M. Gorky (PSU)	Moscow Power Institute (technical university) (NRU MPI)	The MFA of Russia-MSIIR
Gubkin Russian State University of Oil and Gas (Moscow) (RSU)	Novosibirsk State Technical University (NSTU)	Samara State Technical University (SSTU)
Mendeleev University of Chemical Technology of Russia (Moscow) (MUCTR)	Russian Economic University named after V. G. Plekhanov (Moscow) (REU)	Siberian State University of Railway Engineering (Novosibirsk) SSURE
St. Petersburg State University St. Petersburg SU	Russian State Social University (RSSU)	Tyumen State Architectural and Construction University (TSACU)
Tyumen State Oil and Gas University (TSOGU)	Ural State Mining University (USMU)	Ural State University of Railway Engineering (USURE)

a task for large and medium-sized extracting oil and gas companies of their financial and other resource participation in this preparation (retraining) of needed engineering personnel and professional development of experts.

Many universities of our country are aimed at high-quality preparation of engineering personnel and working experts. The complex analysis of such universities is presented in Table 1. In Tyumen Region such university center is Tyumen Oil and Gas University.

TSOGU is one of the centers of creation and introduction of technologies which are able to provide effective and successful development of new fields. On the territory of university there are 19 research institutes and laboratories, 4 from them were founded together with the Russian Academy of Sciences. Various innovative development which are most approached to production are conducted. Introduction of some new technologies will allow gaining in 3 years economic effect >25 billion rubles annually (Shevelyova, 2014). The university developed and is realizing projects of development of cryogenic resources of our region. For instance, use of gas hydrates or valuable biological raw materials will become very relevant in the future. Such projects are developed together with Institute of Earth Cryosphere which is one of the most advanced research establishment in the field of cryology in the world.

METHODS AND RESULTS OF SOCIOLOGICAL RESEARCH

It should be noted that high qualification of teachers of universities and improvement of technologies of training also plays an important role in training of highly qualified specialists. For realization of this task, it is necessary to develop the project of teachers' training for work in the new operating system allowing to improve skills and to improve training methods. For implementation of this project, it is necessary to analyze a rating of the higher education institutions of the country which are carrying out training in specialties of the oil and gas direction. This rating was made by the all-Russian Public Organization "Business Russia". For drawing up rating surveys of the following departments were conducted:

- HR departments of the large Russian companies of oil and gas branch (the volume of selection made >1000 units)
- Successful young employees who graduated from the university during 2009-2014 (the volume of selection made >2000 units)

Also >40 expert interviews were conducted and processed with:

- Representatives of the top and average management of the main business structures and divisions who effectively and long enough cooperate with an education system, providing workplaces to graduates of TSOGU first of all
- Heads of authorities in education (regional and federal level was involved)
- Heads of the top and average management of the research centers, dealing with problems of the higher education (which acted as experts)

These are the indicators of a rating:

Cooperation of the promising companies as potential employers with higher education institutions: This cooperation is conducted by carrying out promotion campaigns for graduates' recruitment and by the similar promotion campaigns concerning trainees. Much attention is paid to preferences in a choice of future experts for work in the company from a position of higher education institution and existence of strong contractual links between the employer and higher education institution. It should be noted also that the management of the companies asks higher education institutions from which they graduated for recruitment of promising young personnel.

Competitive level of a salary of university graduates: After the analysis and processing of polling data the list of the leading Russian higher education institutions which graduates go to work in the large oil companies was made. Further, the list of the leading higher education institutions was divided into three subgroups which were called leagues: as relevant α , β , γ leagues. The group was made by the integrated characteristic from the greatest to the smallest. This list is presented in Table 1.

On the basis of Tomsk Polytechnical University the master program of Heriot-Watt University is founded and working. Training process duration according to this program takes 1 year.

The Russian graduates have to be competitive in the international market. Carrying out the analysis of educational programs of specialists' training of oil profile it is necessary to list the prestigious universities which are out of Russia: Texas A&M University, College Station, University of Texas at Austin, Stanford University, Colorado School of Mines and University of Oklahoma.

At universities the direction of students' 4 training on the international master programs together with leading universities of the world was formed and is being developed at present.

In September, 2015 on the basis of the Russian state geological prospecting university named after S. Ordzhonikidze meeting on education problems in the sphere of geology took place. At this meeting, there were participants from 30 leading educational institutions which carry out training, first of all in the field of applied geology, representatives of the Federation Council of the Russian Federation, the State Duma of the Russian Federation and expert community.

Main objective of this arrangement was that many large companies such as JSC Rosgeologiya and JSC Transneft-Siberia are aimed at attraction and keeping of young personnel in a profession and improvement of education quality. Thus, much attention is paid to professional orientation work. The solution of personnel problems of the country in general as well as branch or the region is guarantee of effective development and functioning of this subject. Improvement of education quality and motivation of talented youth for work in the field of applied geology, formation of personnel potential are important tasks which business, the state and educational institutions have to solve in cooperation.

For the last 15 years staffing level of the geologic exploration organizations by experts with higher education has been decreased almost by one and a half times, the share of the age personnel grew and at the same time the share of the personnel in economically active of age category till 40 years decreased. Now the average age of workers of Rosgeologiya makes 46-47 years. Therefore, each large enterprise is faced by a problem of personnel policy namely achievement of optimum balance of processes of updating and preservation of quantitative and qualitative structure of the personnel. An opportunity to provide continuity of knowledge and experience from the senior generation to youth is important as well. The oil branch needs young qualified personnel.

Following the results of meeting the initiative of formation of all-branch strategy of development of personnel potential was supported.

The analysis of the software products used at training of specialists: Today for modeling of various geological processes there is a number of information products of both the Russian and not Russian production. The best from a position of modeling and programming from the existing information systems are Petrel (Schlumberger), Irap RMS (ROXAR), Surfer, Tigress, GOCAD, Strata Model (Landmark). From them Petrel (Schlumberger) and Irap RMS (ROXAR) are widely used. These programs are rather powerful information systems which cornerstone the modular principle is. The modular system allows considering all technological chain necessary for the solution of problems of modeling of geological processes.

Petrel is a software package of the Schlumberger company for creation of geological and hydrodynamic models and also an assessment of geological deposits.

Petrel is the complex program which includes a wide range of modules and allows working as with basic data for creation of models and with models.

Important functional feature in work with the Petrel program is opportunity to describe reservoirs in real time that helps to update quickly models in process of receipt of new data to control scenarios of calculation for the exact analysis of all development and to analyze risks and uncertainty throughout all existence of a field (Kanevskaya, 2014).

IRAP RMS is a modular program complex intended for modeling of geological and hydrodynamic processes. This complex includes innovative technological and information development in the field of dynamic modeling. Hydrodynamic modeling and design allows to optimize development of deposits and to raise economic effect of development. Big plus of this program is that it allows projecting and modelling the processes happening at all stages of functioning of a field: from a choice of a geographical arrangement of geologic exploration works and design of wells and finishing with calculation of stocks.

During work on this subject and the analysis of the available software products authors chose the Visual Age for Java 3.5 Program on the basis of the OS/2 Warp Connect 4 Operating System.

By means of this, rather simple and effective program it is possible to improve qualification and level of teachers at the considered universities. It is necessary to develop the course directed on training to work with this means of

Java-applications and also to work bases with a new operating system of university teachers for their further use when training experts.

The Visual Age for Java 3.5 Program will give the chance of improvement of quality of training. Rather simple in work, it allows creating the innovative, meeting the modern competence-based requirements distributing material, a course of laboratory works with the detailed description and illustrations.

OS/2 Warp Connect 4 represents the new, expanded version of the modern software. The modern interface of the program and a number of innovations facilitates work with it and gives great opportunities. The OS/2 System provides the whole set of innovative means of network interaction that within the large company helps to cut expenses significantly. On the basis of this software the IBM company developed an innovative product the Visual Age Smalltalk programming language. Unlike other popular programming languages such as Visual Basic, C++ and the object pascal, Visual Age Smalltalk differs in proximity to a natural language of human communication that simplifies its understanding and considerably facilitates process of training of this programming language (Fig. 1). Examples of modeling of geological processes are presented in Fig. 2.

At possession of skills of work with Visual Age for Java 3.5, creation of 3D images of objects of research for their visual assessment is initially possible (Glebov, 2006). Also, Visual Age for Java 3.5 differs in simplicity of the interface, there are no those numerous windows and buttons which frighten the beginner and complicate to adjust for work in this program (Zakrevsky, 2009).

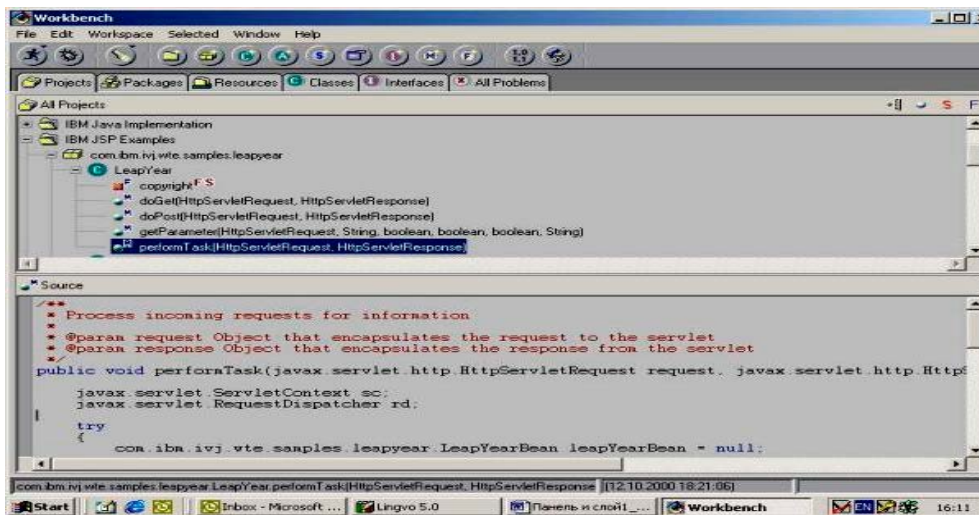


Fig. 1: Interface of the Visual Age for Java 3.5 Program

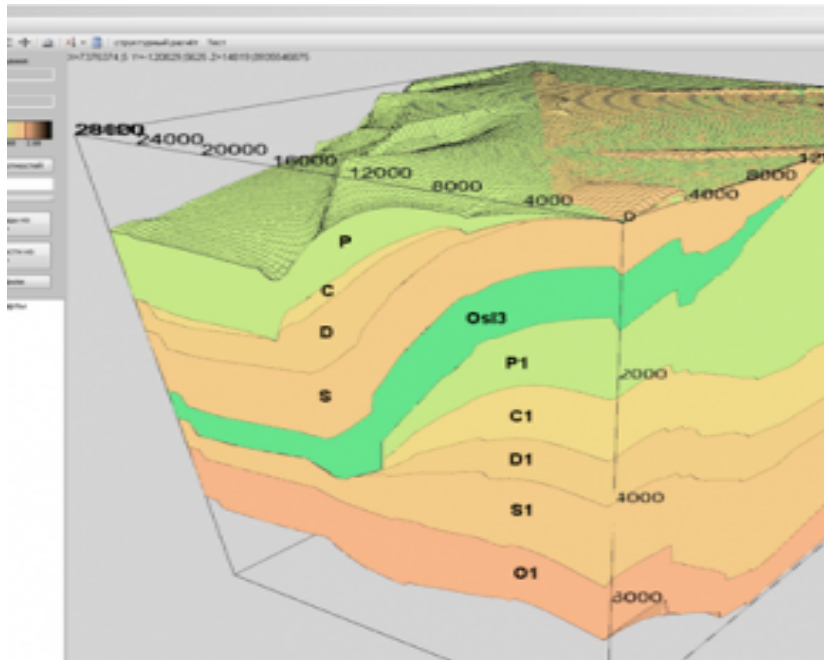


Fig. 2: Modeling of geological processes by means of Visual Age for Java 3.5

Draft decision of an educational task: Now the institute of development of innovative projects in Ufa proposes some innovative solutions in education such as interactive boards, a digital microscope. Purchase of similar development at present in Russia costs very much and therefore the course in programming for teachers will give the chance to everyone on the basis of the university to develop independent projects. The problem has at least two solutions.

The first option is to issue special literature (a series of textbooks) for independent studying in which it is possible to review the main opportunities and examples of use of the software product in oil and gas production.

The second option is to develop a course, using innovative methods of teaching who will help to master for the shortest time the principles of modeling and work with the OS/2 Operating System and also the scheme of work in the Visual Age for Java 3.5 Program.

The second option looks economically more attractive because allows to master completely for rather short time methods of dynamic programming under the leadership of skilled teachers or independently.

In the course assumed by researchers the text of lectures consists of eight parts. The first part is a survey, it is devoted to opportunities of the OS/2 Operating System and in the subsequent parts the detailed description of parameters of the Visual Age for Java 3.5 Program is given. The developed course contains ten

Table 2: The scheme of calculation of cost of works

Name of articles	Expenditures (rouble)
Salary and insurance payment	65000
Materials	16390
Expenses on operation of the computer equipment and other office equipment	61530
Indirect costs	35230
Planned cost of works	176150
Charge	5284,5
Full cost of works	355584,5

laboratory works which are devoted to the basic rules and opportunities during the work with Visual Age for Java 3.5. Reasoning from this fact the estimated duration of a course makes 10 days. Training will be provided on the basis of Tyumen State Oil and Gas University. Teachers of above-mentioned educational institutions will be sent to the advanced training courses. The scheme of calculation of cost of works is presented in Table 2.

Approximate period of implementation of this project 3 years. Also, on the basis of Tyumen State Oil and Gas University, it is supposed to introduce system of forecasting and high-quality monitoring of a personnel state in general which will promote formation of target figures of enrollment of students and the order for training of specialists.

CONCLUSION

A situation in oil and gas branch of Russia from a position of personnel support is not favorable in the organizational and innovative matters. Therefore, the

model of the advancing education concerning both engineers and specialists of this branch is necessary.

Transition of Russia to “new educational model” has to be reflected in further development of the Russian geological science and also the principles of reorganization of subsurface use. In this regard, there are new priorities of science and technology, non-conventional for Russia.

On the basis of Tyumen State Oil and Gas University, it is supposed to introduce system of forecasting and high-quality monitoring of a personnel state in general which will promote formation of target figures of enrollment of students and the order for training of specialists.

It is necessary to use innovative technologies of training in system of the advancing and continuous education. On the basis of the conducted sociological research and the analysis of the existing software products used in education it is offered to develop the course directed on increase of educational level of experts of oil and gas.

In system of oil and gas and geological education of the Russian Federation it is necessary to adhere to the principles of the advancing social order. Only in this case the education system existing at present in Russia will be socially demanded.

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