

Role of Physical Culture and Sports in Training Oil Engineers

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Abstract — The article analyzes the influence of physical culture and sports on professional and labor activities of oil and gas engineering students. It presents evidence that physical education and sports are an important factor increasing the economic efficiency of modern oil production and social development of workers. To be efficient workers, oil engineers must be strong, quickly respond to situations, be courageous, decisive, sociable, resistant to temperatures and toxic effects. Therefore, universities students need to engage in professional-applied physical training (PAPT) aimed at psychophysical training for professional activities.

Keywords — *physical culture, vocational and applied training, vocational work, petroleum engineer, efficiency*

I. INTRODUCTION

Currently, to be an efficient worker, it is necessary to engage in physical culture and sports. Physical education helps increase productivity, promote health, make it possible to get less tired during work and recover quickly after working hours, to counteract the influence of adverse factors of labor and prevent occupational diseases. Workers involved in sports have higher rates of physical development and physical fitness (general and special endurance, strength and speed performance, coordination of movements). They cope with production standards. The role of physical fitness is important for a stable morale, because it helps fight stress and nervous shocks. By reducing the number of diseases of workers, increasing professional efficiency and productivity, the economic efficiency of production increases.

Therefore, many employers pay attention to the physical state and health of their employees. After all, the company needs a healthy, physically trained employee who is not afraid of difficulties and workload. Managers prefer healthy employees, rather than with those who are often need to pay for “hospital” and commercial treatment. Appearance of employees is also important. It affects the company performance. If an employee looks healthy and attractive to customers, the business can improve. An employee in a good physical state has a great working capacity. Increased efficiency is directly related to an increase in the performance, since if a person is not afraid of workload, s/he will do his job efficiently.

II. METHODS AND MATERIALS

Each profession has its own level of development of worker's psychophysical qualities, list of professional skills [1]. An oil engineer needs a professionally applied physical training. Therefore, as a part of the discipline "Physical Education" PAPT was introduced. Its aim is psychophysical training for successful professional activities. Future professionals should be prepared for high-performance work, prevention of occupational diseases and injuries, professional longevity, use of physical culture and sports for active recreation and recovery during working hours and in free time. The tasks of professional-applied physical training are as follows:

1. formation of applied knowledge and skills;
2. education of applied psychophysical and special qualities.

Thanks to applied skills and abilities, safety is ensured at home and during working hours, production tasks are quickly and economically solved. Applied physical qualities - speed, strength, endurance, flexibility and agility are required for many professional activities. Exercises, sports, games can form specific mental qualities and personality traits that will ensure successful professional activities. For example, oil and gas employees have to climb a plant 40 meters in height [2].

Not everyone is able to climb this plant along narrow passages and ladders. It is necessary to develop this skill in students. Compliance with established norms and rules of behavior (collectivism, endurance, respect for opponents, hard work, self-discipline) is transferred from sports to everyday life, professional activities. Conscious overcoming of difficulties with the help of regular physical training and sports, the struggle with fatigue, pain, and fear bring up will, self-discipline, and self-confidence. Applied special qualities include the ability of the body to withstand various environmental influences: cold and high temperature; motion sicknesses in vehicles; insufficient pressure in the mountains; gas pollution of oil enterprises. These abilities need to be improved through hardening, training outdoors, doing special exercises developing the vestibular apparatus.

III. RESULTS AND DISCUSSION

The modern petroleum industry consists of diverse subdivisions with about 700 types of jobs. Thousands of

technicians and engineers manage complex processes. High technologies are used in oil production and oil refining; research teams are involved in their development and research. Therefore, the prestige of jobs in the field of geology and geophysics of oil and gas, well drilling and oil production, design and construction of oil pipelines, oil and gas processing and petrochemistry, oil and gas economics and management is high. However, there are increased requirements for health, physical and personal qualities of workers.

Oil and gas specialists work on watches, they have to face disturbing factors: differences in the climate, temporary displacement, intensive work and a long period of rest; frequent changes in the social environment in shift teams. In some branches, the turnover rate is high. Therefore, the training process should be individual, with increased requirements for the level of mental and physical readiness [3]. The readiness involves special labor, mental and physical readiness. Psychophysical readiness is a combination of characteristics that combine the status of the cardiovascular system, biochemical status and growth and weight characteristics. The first component of professional psychophysical readiness is a physiological status; the second one – resistance to functional loading.

Functional stability of the human body is the third component of psychophysical readiness. Physical fitness is the fourth component of psychophysical professional readiness. The oil and gas industry is one of the most mechanized industries; hard physical labor was replaced by tools; various technological processes are used. However, specialists may be exposed to adverse factors [4]: chemicals and dust, noise and vibration, adverse weather conditions, radioactive substances, increased physical load.

The main adverse factor is gas effects. Hydrocarbon and hydrogen sulphide of high concentration are located in the working premises. For example, in the carrier, air pollution with hydrocarbon ranges from 56 mg/m to 82 mg/m (at a rate of 30 mg/m), with hydrogen sulfide - from 6.3 to 10.1 (at a rate of 3 mg/m). The gas factor acts in combination with certain physical production factors. Thermal effects and physical loading affect the physical state. Increased heat transfer has a negative effect on blood circulation and thermoregulation. Industrial noise is the second most hygienic factor.

Due to mechanization of technological processes, intensity of noise, vibration and ultrasound increases. Maximum permissible noise concentrations in the workplace of petroleum engineers increased by 10-15 decibels. Prolonged exposure to noise causes hearing loss. The use of high temperatures in petroleum production influences meteorological factors. Fumes, gases, toxic substances and heat act simultaneously. In summer, there are elevated ambient temperatures that are complicated by low relative humidity, and in winter the working area can be overcooled. In winter, the adverse factors are low temperatures, strong winds and snow. Thus, the main factors determining working conditions of oil and gas production specialists are air pollution with toxic substances, medium and high frequency noise, and temperature changes [5].

Studying the professional activities of oil and gas workers, applied physical qualities required for each group of specialists were identified. There are various types of work activities of experts in oil and gas production. These types can be subdivided according to the type of work activities (physical, mental), means (manual, mechanized, automated, automatic), working conditions (comfortable, extreme, harmful, dangerous), labor organization (static, dynamic, monotonous, individual, collective); requirements (vocational education, professional experience, good health and physical development, psychophysical fitness). Based on these characteristics, specialties can be divided into three groups:

1. Specialties with a mixed nature of work: mental and physical (technology engineers, production technology automation engineers, oil and gas transportation and storage engineers). These specialties require quick reaction, good coordination of movements, attention, thinking, high endurance, strength, agility.

2. Specialties with high physical loading (drilling engineers, geologists and geophysics engineers, construction engineers). They require strength, attention, emotional stability, coordination of movements. When working in extreme conditions, specialists in offshore drilling, geologists, and geophysicists need general endurance, courage, and determination.

3. Specialties with the sedentary nature of work (engineers, economists, computer engineers, lawyers, managers). They coordinate and adapt all systems. In addition, the following qualities and skills are required: sociability and interpersonal skills. Thanks to the scientific and technological progress, the role of oil and gas production engineers is increasing [6]. However, the work of engineers is becoming more responsible, stressful and complex. Petroleum engineers perform various functions. They are involved in team management, plan production, development of technologies; they implement labor protection measures. Managers select and train personnel, deal with logistics and sales, manage production and control product quality. The engineer is responsible for providing the workplace with tools, maintenance, energy and transport services. Due to mechanization and automation of modern oil and gas production, implementation of complex technologies, engineers work in the workplaces [7].

A modern engineer has a large amount of responsibilities involving the work of two thirds of muscle groups (during technological and preventive inspections of workshops, field tests of equipment, repairs). Engineers have to walk a lot. One of the indicators of a highly qualified specialist is a good response needed for automatic production management. Engineers experience significant emotional stress because they are responsible for decision-making, health and lives of subordinates. Stress reduces performance, causes errors, conflicts, accidents, diseases of the cardiovascular and central nervous systems. Therefore, the engineer has to be emotionally stable to maintain high performance in stressful situations. The engineer has to be able to control his feelings. These volitional qualities are important in creating good relations with other workers.

Engineers must be disciplined, follow existing laws, rules, and regulations. Discipline means conscientious performance of duties, execution of orders of senior managers. Discipline is a volitional skill which develops self-exactingness. The basis of physical fitness is comprehensive physical development which improves body functions and skills required for a future specialist. The physically developed body is able to withstand overheating, vibration, motion sickness, hypothermia. After all, human health is only 10% dependent on medicine, and 90% depends on the level of physical fitness and a healthy lifestyle.

Physical fitness needs to be improved, as there are increasing demands in controlling sophisticated equipment and production technology. With aging, professional qualities deteriorate. For example, 30-year-old workers and older ones have decreased speed, strength, and endurance. By the age of 50, the rate of muscle contraction is 60-90%. Therefore, physical culture and sports are an important factor in increasing the economic efficiency of oil production and social development of workers [8].

Therefore, a petroleum engineer should have knowledge, skills, habits for using physical culture and sports in solving production problems. Today, it is not enough to graduate from an university, and go in for sports. It is necessary to organize sports activities, plan the work and rest of employees, contributing to their rehabilitation. While studying at the university, the student can develop psychophysical qualities in accordance with job requirements. The role of physical culture in preparing for a future job is to increase psychological readiness. The engineer has to work with people, be psychologically confident and sustainable when managing people. Physical education contributes to development of a strong personality as people get used to endure physical and mental stress. Petroleum engineers work in the taiga, desert, tundra, overcome difficulties and dangers.

The drilling engineer should be able to manage the well drilling not observing the process, relying on indirect information. Sometimes wells are drilled around the clock, often there are situations when investment costs are in danger. Then the drillers have to risk their lives to save the well.

The gas industry engineers work at underground gas storage stations, research and design institutes. Geographical, climatic, geological and physical conditions of natural gas fields are diverse. Processes occurring when developing deposits are complex, so students have to acquire professional knowledge of geology and chemistry, physics and mathematics as well as to have good health. They also have to be able to manage production processes [9].

Oil industry specialists are engaged in oil field development, oil extraction and designing. The oil field is a complex system. The oil extraction process involves the following stages: 1) control of the movement of liquid and gas at various depths and in various geological conditions; 2) lifting of liquid to the earth surface; 3) extraction of oil and gas. To solve these problems, good health and physical fitness are required.

IV. CONCLUSION

In order to be an efficient worker, petroleum engineers must develop strength, general endurance, responsiveness, courage, decisiveness, sociability, and resistance to temperatures and toxic effects. There are increased requirements for psychophysical and personal qualities. Therefore, medical examination is carried out to confirm professional competence.

Physical qualities are as follows: strength (including, strength of back, arm and leg muscles); agility (climbing ladders); general and static endurance (length of the working day is 12 hours, duration of one watch varies from 15 to 30 days, the daily load varies from 3-5 to 25 tons).

Among the psychophysiological functions, the main ones are vestibular stability, space-time orientation, and attention [10].

Personal qualities required are as follows: operational thinking, stability in extreme situations, self-control, courage and determination, willpower.

The specialist should know about occupational diseases, be able to patch up, swim, and drive vehicles.

It is necessary to engage in general physical training (athletics, power gymnastics, weight-lifting and barbell), go in for sports (badminton, basketball, football). Exercises should be carried out outside. Petroleum engineers work in the office using computer programs, and in the field. Therefore, students need to acquire professional knowledge of geology and chemistry, physics and mathematics and have good physical qualities and good health. In order to work for an oil refining company, a number of professional and personal qualities are required [11]: purposefulness, stress resistance, communication skills, ability to take responsibility and mobility [12]. These are main personality traits of any specialist who wants to become successful. Therefore, it is important to have good health and go in for sports.

References

- [1] A.R. Milian, V.R. Aguilar, M.G. Pairo, "The preparation of the teacher of physical culture in health and prevention: a way for the direction of the training of the graduate of the degree in education = La preparación del docente de cultura física en temas de salud y prevención: una vía para la dirección de la formación del egresado de la Licenciatura en Educación", *Universidad y Sociedad*, vol. 9, no. 3, pp. 173–176, 2017.
- [2] O. Voitovska, S. Tolochko, "Physical education teachers' perspectives in a changing world: from future studies to new physical culture", *Philosophy and Cosmology*, vol. 20, pp. 139–145, 2018. DOI: 10.29202/phil-cosm/20/13.
- [3] R.F. Tazetdinov, G.G. Tazetdinova, N.A. Krasulina, A.V. Greb, "Maximal oxygen consumption rates in students" physical health tests and analyses", *Theory and Practice of Physical Culture*, no. 6, pp. 102–104, 2018.
- [4] A.Y. Polyakov, "Full-fledged level of physical training of a specialist is an integral part of stability of a work process", *SHS Web of Conferences*, vol. 50, pp. 1–3, 01218, 2018 [CILDIAH–2018 – Current Issues of Linguistics and Didactics: The Interdisciplinary Approach in Humanities and Social Sciences]. DOI: 10.1051/shsconf/20185001218
- [5] A. Bestard-Revilla, E. Sivila-Jimenez, "The scientific research in the formation of the professional of the Physical Culture = La investigación científica en la formación del profesional de la Cultura Física", *Arrancada*, vol. 17, no. 32, pp. 202–214, 2017.

- [6] G. Li, "Analysis on the conceptual innovation of sports culture in international communication based on the values of physical education", *AgroFOOD Industry Hi-tech*, vol. 28, no. 3, pp. 3486–3488, 2017.
- [7] L.Z. Samigullina, E.F. Samigullina, "Oil and gas business specialists' professional discourse structure and functions study", *SHS Web of Conferences*, vol. 50, pp. 1–5, 01221, 2018 [CILDIAH–2018 – Current Issues of Linguistics and Didactics: The Interdisciplinary Approach in Humanities and Social Sciences]. DOI: 10.1051/shsconf/20185001221
- [8] L.M. Lara, E. Rich, "The studies of physical culture at the university of Bath, United Kingdom: Dimensions of an approach that goes way beyond physicality = Los estudios de cultura física en la universidad de bath – reino unido: Dimensiones de un enfoque mucho más allá de la fisicalidad", *Movimento*, vol. 23, no. 4, pp. 1311–1324, 2017. DOI: 10.22456/1982-8918.74326.
- [9] E.R. Vasilyeva, A.R. Nurutdinova, "The academic model of managing integration processes: study case of the multicultural educational space", *SHS Web of Conferences*, vol. 50, pp. 1–3, 01223, 2018 [CILDIAH–2018 – Current Issues of Linguistics and Didactics: The Interdisciplinary Approach in Humanities and Social Sciences]. DOI: 10.1051/shsconf/20185001223
- [10] A.Z. Ibatova, N.V. Ippolitova, S.K. Mukhametgaliyeva, A.E. Rodionova, Kh.N. Yagafarova, L.N. Ikonnikova, "Lifelong Professional Education in the Russian Federation: Personal Aspect", *International Journal of Environmental and Science Education*, vol. 11, no. 16, pp. 9426–9436, 2016.
- [11] O.V. Danilova, "Peculiarities of Forming General Cultural Competences in Students of Institutions of Higher Technical Education by Means of Interdisciplinary Integration", *SHS Web of Conferences*, vol. 50, pp. 1–5, 01216, 2018 [CILDIAH–2018 – Current Issues of Linguistics and Didactics: The Interdisciplinary Approach in Humanities and Social Sciences]. DOI: 10.1051/shsconf/20185001216
- [12] E.A. Mukhtasarova, F.G. Safin, "State of modern russian youth tolerance", *European Proceedings of Social and Behavioural Sciences*, vol. 50, pp. 206–213, 2018. [RPTSS–2018 – International conference on research paradigms tranformation in social sciences]. DOI: 10.15405/epsbs.2018.12.26