What is the role of physics in the drilling profession? The researcher Fred Dupriest began teaching a physics-based drilling course at Texas A&M, the first of its kind, in 2013. It is currently taught by Neunart, and this course remains unique, students are taught physics at the initial stage of drilling, as well as ways to identify and reduce performance constraints. At the initial stage of the project Fred Dupriest provides training in the physics of drilling mechanics, workflow, step-by-step tests and communications in order to involve everyone in drilling operations. What physical effects occur with drilling of oil and gas wells? These are the effects of impact. During the drilling process, a failure may occur in which one equipment damages another due to the impact. When drilling, Hooke's law is applied. Also, with the help of a physical law, it is possible to solve the main problem of the penetration rate. During the drilling process, the physical properties of the formations are constantly measured: temperature, electrical conductivity, magnetic susceptibility, radioactivity. This process is called logging. Unconventional engineering solutions are used for ultra-deep drilling. There are also physical problems and ways to deal with them: the drop between the hydrostatic pressure of the drilling mud column and the lithostatic (rock) pressure of the rock. To balance it due to special fillers, the density of the drilling mud is increased to about 2 g / cm3. Since the reservoir temperature at great depths exceeds 100-200 degrees, special equipment is needed to work on such wells: metal parts and joints, lubricants, drilling mud, specialized measuring equipment.

Conclusion.

Such physical quantities as force, pressure, mechanical stress are used to describe drilling processes and also to consider the properties of rocks undergoing drilling. Elasticity, compressive and tensile strength, plasticity are the most important mechanical properties of rocks that affect a number of processes occurring in the formation during development and operation of deposits. These concepts are physical, it is impossible to define them without knowledge of the basic physics.

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THE SPECIFIC NATURE OF INTERDISCIPLINARY EDUCATION IN THE TRAINING OF MODERN ECOLOGISTS

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The modern development of technology has led to the degradation of the unfavorable environmental situation and the rise of a global environmental crisis. Every day humankind produces about 5 million tons of garbage, loses thousands of hectares of forest and consumes at least 12.5 million tons of food, a third of which in the end is simply thrown away [3]. The losses of society, which are driven by the increase in environmental disasters, may destroy all the results of economic progress in the near future. The development of ecological competence, sensible and careful attitude to resources, ecosystems and the planet as a whole is necessary for further comfortable and safe existence [1]. In this regard, it is proposed to conduct environmental education and training from the first year in general by introducing environmental knowledge into the content of socio-political, general education, general scientific and special disciplines [2]. Modern graduates, who are responsible for further development of technologies, face the challenge of organizing them in such a way as to minimize the impact on the environment, increase the volume of waste-free and energy-efficient production [7].

The basis of students' acquisition of knowledge in the field of environmental protection lies in the formation and development of scientific concepts in the process of learning. Concepts must be formulated correctly in order to objectively reflect the scientific world. It is important that the formulated ecological concepts reflect the interaction of a man and the environment holistically and objectively. In nature there are principles of ecological self-regulation, and each person must consciously take them into account, as well as anticipate the consequences of interference in the natural environment [5,6,8].

The purpose of this article is to study the features of interdisciplinary education of modern ecologists and to collect the data necessary to establish interdisciplinary connections in this field.

The research material included the works of such scientists as Aristotle, Theophrastus, and Pliny the Elder, these works were devoted to the history of animals - ecological classification, habitat, daily activity, etc., the basics of geobotany and the economic nature of zooecological concepts. Also, the research material includes more modern works by such scientists as Broglie, who conducted one of the first environmental experiments - the effect of atmospheric pressure on animals. Linnaeus, who described the concept of equilibrium in nature, assessed the leading influence of climate conditions

and described phenological observations - the death of some organisms as a means of existence for others; Buffon described the influence of environmental factors, as well as an exponential population increase of some animals. Charles Darwin also made a significant contribution to the development of the study of ecology, he explained the parasitism of the cuckoo, the death of large animals from catastrophic causes, the theory of the coral reefs origin, the classification of the relationships between organisms [6]. There are also more recent works, for example, Henry Chandler Colesgiep was one of the founders of the «dynamic ecology» research, where he found evidence of succession in the growing season of soils, associated with age. The principle of interdisciplinary environmental instruction represents a version of pedagogical modification and practical implementation of a systematic approach and is aimed at the coordinated study of certain environmental problems by means of various academic subjects. Environmental training is aimed not only at the development of a trustworthy comprehension by learners, but also at their understanding of moral values and attitude to environment, at instilling patterns of environmentally satisfactory behaviour and developed operation in the environment. Within the individual subject («Ecology») these tasks are hardly achievable for certain reasons.

- Environmental education cannot exist without knowledge, expertness and adeptness traditionally related to different subjects. A methodical analysis of the contemporary environmental problems calls for pooling of information and methods of various disciplines, which implies involvement of experts from different areas in students' environmental education. The systemic nature of modern environmental questions requires different attitudes to their consideration and analysis. Within the framework of a single discipline, it is impossible to ensure the acquisition of all the knowledge, values, attitudes, skills and abilities necessary for solving modern environmental crises. The issues of ecology, environmental ethics and modern environmental crises should be considered in many disciplines in the field of life sciences, Earth sciences, etc. Effective environmental education should include a system of various types of cognitive and practical activities that correspond to systemic, interdisciplinary and global approaches to solving modern environmental crises.

The advisability and necessity of applying the principle of interdisciplinarity in environmental education is also conditioned by the objective interaction between the world of nature and humankind. Obviously, each academic subject can ensure the exposition of not all, but only individual ecological worldview, ideas that are inherent in this particular academic subject, consistent with its structure and content. Moreover, the solution of specific problems of environmental education in the process of teaching a particular academic subject should be subordinated to the general structure and logic of the given subject.

All the main disciplines studied by students of economic and managerial professions have a certain ecological education potential. The problems discussed in such disciplines can make a certain contribution to the formation of scientific ecological concepts necessary for students to understand the physical, biological, geological, social and other mechanisms of the environmental functioning. Qualitative improvement of the real practice of forming students' responsible attitude to nature and ecological culture in general is possible only through the broad involvement of the achievements of modern natural sciences and humanities in the study of disciplines that seem to be far from nature conservation issues. It is necessary to create and introduce a pedagogical theory and university practice of a new ecocentric paradigm of education into the public consciousness [4]. At first, ecology was closely connected with biology, being considered as one of its sections. The increase in the number of scientific discoveries and successes in the study of sciences in the XX century occurred in the process of close integration of various fields. Related disciplines made it possible to solve problems for which researchers cannot find an answer through the efforts of one scientific branch of knowledge.

In addition to biology, environmental science is most closely related to the following branches:

- chemistry;
- physics;
- mathematics;
- geography.

At the present stage of society development, biological and ecological research is united by a common and extremely urgent goal: to provide a general picture of the nature functioning and to determine the place and role of humankind in natural processes. Chemistry and ecology, mutually complementing each other, create the scientific foundations of rational environmental management and protection, contribute to the optimization of human interaction with nature.

Ecology is related to physics and mathematics:

1. The use of data and knowledge about the physical parameters of the environment (ionizing radiation, atmospheric and hydrostatic pressure, density and viscosity, etc.) and methods of their determination in terrestrial and aquatic ecosystems.

2. Application of physics technologies in water and air decontamination procedures (ultrafiltration, etc.).

3. Application of mathematical methods of analysis and data processing for modeling ecosystems and predicting the development of ecological processes.

Geography makes a significant contribution to solving various environmental problems due to its complex nature as a science located at the junction of natural and social sciences.

Conclusion

Today there are a lot of environmental problems in the world, and environmental education is important for this very reason. Environmental education is a difficult and lengthy process of teaching young people to understand environmental problems and ways to solve them. Thanks to such education people create incredible ways to protect and help our nature and the planet. To do this, it is necessary to study the issues of providing the training process of future ecologists with methodology and practical recommendations for the formation of specialist qualities characterized by the ability to develop and optimally use modern information technologies.

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SCIENCE THROUGH THE PRISM OF ART: INTERCONNECTION AND INTERDEPENDENCE

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Art and science are two fields of human interest without which a man could not imagine his life from time immemorial. There is an opinion according to which they are interconnected and interdependent on each other. At the same time a lot of people strongly believe that they are two completely opposite directions in human development.

The purpose of the article is to establish the influence and relationship between science and art.

In both science and art, the inspirational idea and environment play a significant role. Some scientific discoveries seem to come out of nowhere, while others are made with great difficulty. The scientific view of the world is much more precise, while the worldview of an artist appears to be more abstract. If we argue about the relationship between science and art, we can say that artists assess the world generally by means of feelings and emotions. They invent various technical mechanisms to model the action of certain objects, without going into the details of their functioning. Scientists, on the other hand, often bring these objects to life, draw their thoughts from the fruits of the art, and, taking advantage of important insights, make discoveries [3].

If the influence of science on art is caused primarily by the presence of a cognitive component, then the opposite influence - art on science - is caused by the presence of an aesthetic component in scientific activity. Art itself, as the kind of activity responsible for the satisfaction of human artistic needs, appears to be the main way of developing a sense of beauty, the art of evaluating the aesthetic qualities of objects and phenomena. For the scientist, aesthetic aspects are thought to be additional but very powerful way of testing the truth of his intellectual potential. For the scientist, art is the main factor that stimulates the creative process giving rise to a state of emotional excitement and inspiration, as well as liberating the imagination. Art enlightens and enriches his mind. The biography of some scientists shows that some of them were not far from art. For example, Einstein played the violin, S. Morse painted pictures, and M. Lomonosov is famous for his mosaic paintings [5].

Art has long used scientific knowledge. For example, it is well- known from the history of art that mathematical and optical images influenced on the state of architecture and painting. Painting came into being much earlier than science. It is enough to remember the rock paintings of our ancestors. However, the formation of such science as chemistry contributed to the origin of new paints, which expanded the palette of artists. With the invention of glass, the techniques of smalt and stained glass emerged [4].

As for mathematics, its connection with the fine arts is quite obvious. For example, one of the most famous achievements of Renaissance artists is the invention of the mathematical scheme - linear perspective. Any student knows that an artist should know the laws of perspective reduction [3].

Having examined geometry, one can make sure that the same terms are present both in this exact science and in drawing: line, form, construction of geometric bodies and figures. The geometric style was very evident even in the art of antiquity (ancient Greek vases, composed of geometric forms, with strict compliance with the laws of symmetry). The laws of composition in the fine arts are closely related to geometry, as well. They include the distribution of figures and objects in space, the establishment of volume relations, light and shade gradations and the search for a compositional center.

During the composition and art history lessons we can get acquainted with another very important concept for artists and mathematicians - the «golden ratio rule». Despite the fact that the artist and the scientist solve different problems (the first - comprehends the relationship of man with other people and himself, the second - explores the laws of the universe), both science and art serve the same purpose: the search for truth and harmony in the world around us [4].

The Mona Lisa is surely a work of art known to everyone. It has been the subject of many studies and analyses and has been the subject of many myths and legends. On this example, you can easily prove how mathematics has influenced painting.

Perhaps the most striking example of Mona Lisa's mathematics is that the composition of the painting is built on the «golden ratio» more precisely on triangles that are parts of a regular star-shaped pentagon. But this is not the most striking example in the work of Leonardo da Vinci, showing the influence of mathematics on painting, namely on the composition of the picture.