

Interactive Training as a Modern Specialist Training System in Oil and Gas Industry

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The article deals with comparative analysis of interactive training implementation with respect to the specialists working for the leading energy companies of the world such as Shell, BP, TNK- BP, BOUBON, «GAS-PROM» OJSC. The interactive training is viewed as the training built on interaction of the student with the training environment on the basis of real production processes.

Key words: interactive training, modern specialist training system, leading energy companies, competencies.



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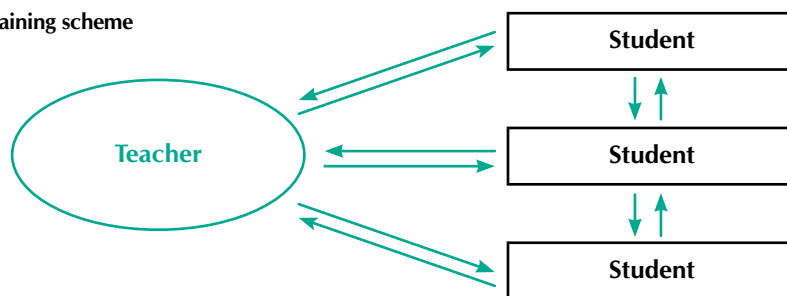
The modern stage of the society development is characterized by high requirements to educational level and competences of the operating staff. It is caused by the implementation of new technologies and process units in production, which allows reducing the number of operating staff and even having some units stand-alone serviced. The staff competences, which are necessary at the moment, are the following: the ability to take decision in accident situation, the ability to use system approach, the ability to use different operation systems, etc. These skills are formed and developed in the process of interactive training. In the general form, the interactive training is viewed as a specially arranged form of cognitive activity. The training process, in this case, allows students to be involved in a cognitive process. They have the possibility to understand and

reflect on what they know and think. (Fig. 1) [6, p. 25-27].

We consider the interactive training in a particular form, as a training built on interaction of the student with the training environment on the basis of real production processes.

The best way for adults to remember information is to be actively involved in the course of training solving practical tasks and exercises. Psychologist researches show that adults remember 20% of what they hear, 40% of what they hear and see and 80% of what they hear, see and do. That is why the training is less effective if students obtain information in a passive way: listening to lectures and watching teaching slides. Doing is here understood as information compilation, critical evaluation of the obtained information and practical implementation of knowledge. Training is the most effective if it takes into account a real situation.

*Heard-forgot, saw-remembered, made-understood.
Chinese proverb*

Fig. 1. Interactive training scheme


The interactive training implementation should include actions that help students to develop critical thinking, to solve real tasks and to acquire skills that are necessary for further effective work on similar tasks. Therefore, the basic components of interactive training are interactive exercises and tasks for students to do. There are two reasons of the effectiveness of interactive training. The first one is direct participation of every student in every exercise. The second reason is a combination of theoretical and practical exercises. The students have to develop the skills which are necessary for everyday working activity [4, p. 158].

The use of modern technical and technological means makes the training very close and true to real production process [2, p. 26]. The elements of interactive training can be a virtual scheme, an automatic training system, a trainer-simulator, a full scale working equipment model.

In this article we try to analyze the interactive training experience obtained by Russian and foreign oil and gas companies in training their staff. To conduct the research the following complementary methods were used: a system analysis, a structural and functional analysis, brainstorming, expert assessments, a historical and comparative analysis and a casual analysis. The interactive training is mostly used in corporate educational institutions as the production safety and efficiency directly depend on competence level of the staff.

Shell Company is an international corporation that unites energy and petrochemical companies in more than

90 countries. The corporation's aim is to satisfy the society needs in energy sources considering economic, social and environmental aspects of today and future [7]. One of the most valuable assets of the company is highly qualified personnel. Shell training centers with KCA DEUTAG company use a drilling trainer DART (Drilling and Advanced Rig Training) to train their specialists. It is a unique computer system that allows developing drilling skills and different engineering situations in real time mode with the use of downhole simulation technology. 3D-graphics, simulation in real time and sound effects made the trainer DART the leading simulator in oil and gas industry. The simulator provides the development of practical skills for working on drilling rigs as well as the optimal ways of drilling. There is software in DART system that effectively integrates and simulates downhole conditions. Thus the trainer can be used in safe conditions by both newcomers and experienced specialists using real project drill hole data. Such training approach contributes to the reduction of time loss while starting up new drill rigs. The full-scale working simulator DART provides realistic practical solutions at the stage of drill crew training before its working on a new drilling rig or before starting a new drilling project. It allows drilling a virtual hole on the set project parameters and identifying potential problems. It also encourages effective communication and friendship in the crew. The financial input into the simulator-trainer is insignificant in comparison with potential product and time loss risks.

BP is an international company, working in more than 100 countries of the world. It does oil and gas exploration and production in 26 countries [8]. TNK-BP is one of the leading oil companies in Russia which is among ten world largest private oil companies in oil output. It was established in 2003 as a result of BP and AAR assets pooling. BP and AAR have the company on parity basis. 50% stake of Slavneft also belongs to TNK-BP. One of the strategy directions of the company is the development of organization potential: that is the development of staff knowledge and skills that meet long-term needs of the business [9].

BP, Shell, Total and other big international companies use the services of BOURBON Company – a leader of offshore oil and gas production [10]. This company works in 35 countries of the world, its staff consists of 8350 people and it has more than 400 ships. BOURBON is based on staff development and quality service for customers. Recruitment and personnel training is the basic point in the strategic plan of BOURBON «SKYLINE -2012». According to the plan BOURBON is going to double the number of ships and the number of staff which is the key to the company's success. To achieve the goal the company has developed a unique training system built on formation of high level skills of all its employees. BOURBON guarantees that its staff is not only qualified and experienced sailors but also specialists that can apply modern exploration techniques. In the frame of its politics BOURBON distinguished key training stages, necessary knowledge and «know how» for every specialty. Then an individual training program for every employee was developed. It includes practical training on shore and at sea to improve professional skills. The training model uses the same methods as the training methods in aviation. The staff qualification is built on basic theoretic knowledge, simulator training and personal professional experience of a student. The training course includes both theoretical and practical

training. To train the staff BOURBON established its own training centers equipped with the trainers that simulate real complicated production operations requiring extremely high accuracy from the staff. The use of simulators for personnel training became a compulsory condition to provide safety and high quality service.

Every exercise done with the help of a simulator has three stages:

- Preparatory phase to distinguish and analyze possible accidents and dangers;
- Modeling practical exercises with a simulator;
- Summing-up by analyzing a student's behavior in any emergency situation.

Maritime simulators are excellent tool for maneuvering in 3D naval operations that require maximum accuracy and safety. A particular thing about the simulator «Safe drilling» is a commander's control panel. On finishing the course the specialists have the competences for anchor and supply operations according to safety and quality standards developed by the company for the best quality service in any place of the world. The simulator training allows the students to understand all the system aspects, to learn the control panel using highly realistic settings. After that the students' knowledge is tested afloat. As an extra option there is a possibility to train the work with dynamic positioning. Being a reliable and multi-functional training tool, the simulator trains the students for real operations. It allows them to model exercises on a ship of class 2, to carry out positioning with local maps, to learn regulatory procedures and communication means and to be ready for emergency situations such as program changes, rapidly changing conditions etc.

A «Work ROV UHD» simulator, developed by Shilling Robotics Company (the USA) and implemented in 2008, helps to train captains and crews who work using robot divers. The simulator is the first and the only one in Southern

Europe and Mediterranean. It simulates very realistically technical inspection and maintenance using 3D modeling, it can also simulate different weather conditions (visibility, streams etc.) and take into account different types of operations: pipeline installation, drilling rig installation etc. The simulator can be adjusted to a particular customer. About 50 captains are going to be trained in the next 2 years. The simulator is developed in a mobile version and can be installed in any place of the world to satisfy any requirements of local companies in this sphere.

OAO «Gazprom» is one of the largest energy companies of the world. Its major business lines are geological exploration, production, transportation, storage, processing and sales of gas, gas condensate and oil, as well as generation and marketing of heat and electric power. The Company places high emphasis on the professional development of its team. Practically all the branch enterprises have their own educational institution. In 2009 the Company adopted a program according to which every educational institution should have its own exercise area equipped with modern full-scale simulators. The educational Center of «Gazprom transgaz Tomsk» OJSC is one of the first who put into operation the exercise area. Its aim is practical training of safe activities and skills required during gas hazardous works and maintenance of modern gas equipment and technologies. To achieve these aims an interactive training system was installed in the exercise area. It involves full-scale working equipment and objects, virtual systems, automatic control systems (ACS), central control systems and the system of training control and analysis in real time. The interactive training system has some workstations for the students. They simulate current condition of main gas pipeline facilities. It also has video surveillance equipment for the pipeline facilities to train control (management) of video streams from cameras. The students are trained in group or individually with a teacher's participation, whose workstation is

connected with database. The teacher manages and controls the equipped training process. At the first stage he/she presents the structure and working principles of single units of equipment and main gas pipeline in the whole using the full-scale working equipment of main and auxiliary facilities. At the second stage the teacher sets the routine operation of the full-scale equipment facilities. Every student controls and analyzes the work of main gas pipeline equipment either from the ACS or from the operator's workstation. The teacher can change the current settings value by means of simulator and (or) emulator in real time. For example, while a gas distribution station (GDS) works, the teacher changes the value of pressure ratio on one of the GDS filters. The student should analyze the situation and take measures to remove the contingencies. At the next stage the teacher uses simulators instead of full-scale working main gas pipeline equipment. The simulators set parameters either of routine operation or emergency situations according to set scenarios. There is a possibility to change parameters in real time. For example, the scenario of GDS contingency operation is downloaded: the pressure increase is on consumer line. The teacher can simulate a pressure regulator failure on the reduction line in real time. At this moment one of the students should do the corresponding shifts (regulations) from ACS of GDS to remove the contingency while the teacher and other students watch and evaluate his/her actions from their ACSs. Modern technological installations are equipped with efficient automation systems of production processes. However it doesn't reduce the responsibility of operators to take right decisions immediately. It is especially true for contingencies, when people's life depend on operator's actions and good team work. Interactive systems, which simulate real operation systems, are effective way for the staff training. Working in usual environment and having automatic skills it is easy for the student to apply them in real operation system.

Training the right actions in routine and emergency situations, the specialists not only increase their qualification but also gain the confidence to cope successfully with any contingencies. As a result, the risk of emergency reduces decreasing production loss [1, p. 85]

Analyzing the existing interactive training systems in foreign companies (BP, Shell, TNK-BP) and in Russian («Gazprom» company) some key points can be distinguished (Table 1).

The comparative analysis allows showing the scale and distinguishing basic elements of interactive training system. It also shows that the assessment criteria of interactive training efficiency

can be error-free operation of personnel as well as accurate actions of the staff in emergency situations with on panic and time loss [5, p. 127].

Thus, analyzing the experience of staff training in the educational centers of Shell, BP, TNK BP, BOURBON and Gazprom, it is possible to conclude that the interaction training model is the prior direction of educational activity in the companies mentioned above, as this is the most adequate form of personnel training in oil and gas industry. But it is necessary to note that these systems need to be constantly upgraded and developed [3, p. 153].

Table 1.

	Basic elements of Interactive system	Interactive system developers	Interactive system development on university basis
Gazprom	ACS, full-scale working equipment lay-out, simulator, 3D models	Educational Centers of Gazprom branch enterprises and equipment suppliers	Effective interactive training systems for young specialist training
Shell	Virtual system, full-scale working equipment lay-out, 3D models	The IS developers are more often the suppliers of oil and gas equipment	
BP	Virtual system, full-scale working equipment lay-out,		
BOURBON	Virtual system, full-scale working equipment lay-out, 3D models		

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