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Ways of Implementing Professional Specialist Training for Defence Industry Complex

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Abstract
The paper introduces the description of learning environment, which accumulates the resources of scientific, educational and production structures and allows ensuring the participation of students and master students in learning, scientific and research activities. Creation of practical-oriented environment within the integrated scientific, educational and production structures allows implementing the educational technologies for practical-oriented learning based on the activity approach and expanding the use of problem- and project-based learning for creating the innovative ideas.

Key words: professional training, advanced practice-oriented learning, specialized department, integrated scientific, educational and production structures.

Introduction

Higher educational institutions should search for effective learning techniques to solve the problem of shortage of qualified employees in the Defence Industry Complex (DIC). These techniques should improve the quality of education, professional competence and mobility of the future professionals. This leads to the changes in the existing talent development framework for the DIC.

High level of readiness to professional environment means creative self-realization of a professional expressed in transformation of the professional medium components into development of innovative products and technologies; optimization of methods and means of solving the professional tasks; introduction of institutional innovations etc.

To improve the quality of training the staff for the DIC of the RF the Ministry of Education and Science selects the universities on a competitive basis and provides them with the additional funds for target admission of applicants, improvement of technical equipment for learning process, the university and the DIC joint organization of target training of students for certain industry. Starting on 28 December 2007 and for the period until 2020 the Government of the Russian Federation has proposed the strategy of developing the system of multilevel permanent education (primary, secondary, higher and professional) in the defense industry complex. The system includes the measures in employee retention in the DIC, development of the specialized departments, industry graduate schools, as well as refresher course and advanced professional training of engineers, employees based on large integrated structures.

Creation of educational profession-oriented environment

The integrated structures have an opportunity to train certain amount of highly skilled professionals with the appropriate set of competence according to the requirements of the enterprises, allow organizing testing sites for scientific and innovation activities, and practice-oriented ones for development and testing different types of adaptive educational programs.

The content of educational programs should be changed and new organizational forms and methods of training professionals for the DIC such as on-line teaching, network forms of implementing educational programs, simulation of situations, youth scientific conference with elements of scientific schools should be found for ensuring advanced practice-oriented training and adapting the content of professional training to the dynamic professional environment.

The base for successful implementation of educational programs of staff training for high-tech sectors of economy on the basis of large integrated structures is the creation of the education environment which accumulates the resources of scientific, educational and production structures and allows ensuring the participation of students and master students in scientific and innovation activity [1].

It is possible to create such environment within the integrated scientific, educational and production structures (specialized departments), training the professionals, researching in certain scientific field and using the results in production and education.

Tambov State Technical University trains professionals for the DIC for the following training areas: 11.03.03 "Design engineering and technology of electronic aids", 11.03.02 "Information and communication technologies and communication systems", 11.03.01 "Radio engineering", as well as master students' магистров по направлениям подготовки 11.04.03 "Design engineering and technology of electronic aids" and 11.04.01 "Radio engineering".

The education institutions have to change the professional training process considering the requirements of enterprises, changes in technical and social progress, in new production technologies, in organization and content of professional activity of the DIC staff. It is necessary to create the special practice-oriented environment, which accumulates the resources of scientific, educational and production structures.

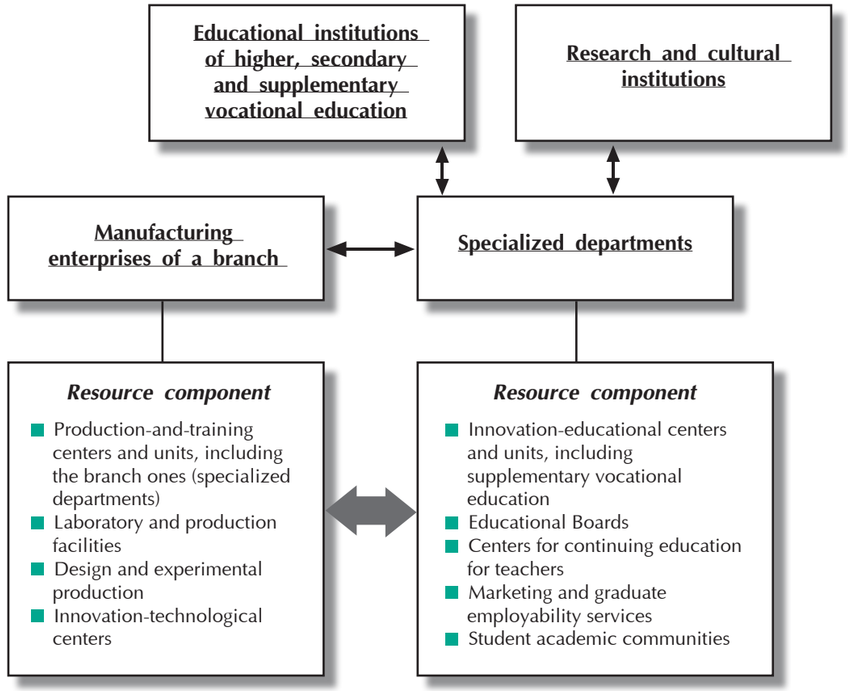
When designing such environment the approach introduced in the work of V.A. Yasvin was used. The author determines the environments as a system of effects and conditions of a personality formation as well as the possibilities for self-improvement in his/her environment [2]. For pedagogical mastering the environment, it is necessary, first of all, to single out and describe its components. V.A. Yasvin in his work analyzes the interaction of a personality and educational environment, proposes the system of psychological and pedagogical design of person-centered developing environments which are based on a concept of educational environment design space model including the subjects of learning process; social, space-object and technological components.

The Fig. 1 demonstrates the model of practice-oriented environment, which makes the learning process closer to real conditions of professional activity.

The features of the practice-oriented environment within the integrated scientific, educational and production structures are inclusion of the enterprise professionals and researchers as equal participants of educational process; use of resources of the DIC manufacturing enterprises and upgrade of training content according to industrial trends in the region and production, along with materials and equipment and information resources of educational institution.

Free access of students not only to information resources of educational institutions but also to the resources of the DIC manufacturing enterprises provides favorable conditions for graduates adaptation to high-tech manufacturing environment; intensifies the process of formation of instrumental and professional competences; encourages creative self-expression of future professionals. The DIC enterprise staff not only implement the educational programs, they develop the programs, determine new perspective activities, develop target training content; prepare teaching materials of educational

Fig. 1. Model of practice-oriented environment within the integrated scientific, educational and production structures



modules; organize and carry out laboratory practice in production conditions, advising students engaged in research.

Creation of the practice-oriented environment within the integrated scientific, educational and production structures (specialized departments) allows implementing educational technologies of practice-oriented learning based on the activity approach and including the innovative project method (integration of problem- and project-based learning and TRIZ – Theory of Inventive Problem Solving). These technologies are formed for implementing Product Lifecycle Management (PLM) when designing and producing IT-based high technology products. The key component of the PLM are: Product Data Management (PDM), Collaborative Product Development (CPD), Computer-Assisted Design (CAD), Computer Aided Engineering (CAE), Manufacturing Planning Management (MPM), as well as educational technologies expanding application of problem- and project-based learning and aimed at creating the innovative ideas.

First of all, these are the methods developed within the Global Initiative of training CDIO engineers (Conceive – Design – Implement – Operate). Within the frames of these educational technologies, the interactive methods are implemented. They create divergent thinking («brainstorm», morphological analysis, focal object methods, planned error method), convergent thinking (synectics, analogues, case analysis, incident method) and widely used TRIZ and cognitive technologies (IT focused on creation a person intellectual abilities).

When developing the educational technologies the differential learning regularities are taken into account, the optimal conditions for detecting abilities, cultivating interests and capabilities are made and mechanisms of the program material acquisition at different levels considering certain tasks of human resource development at the DIC are implemented.

The authors refer the principles of consistency, professional character, relevance, focus on a personality, self-fulfillment and self-reflection, synergism and focus on innovation, to the methodological system, professional training of the staff for the DIC within the practice-oriented environment of the integrated scientific, educational and production structures.

All the components of the practice-oriented environment aim at implementation of such functions as: training, learning, adaptive, information, communicative, technical and scientific. The practice-oriented environment relevant to the professional one and created in the context of integration of science, education and production allows bringing the learning process closer to real conditions of professional activity, allows the students to "fall into" the problem similar to the professional one, that promote the formation of students' systematic vision of the functions carried out by the professional, set strong inner motivation for solving the professional tasks.

Every year the 5–7 graduates with successful target training hold the permanent posts of the specialized departments. In this way the graduate employment issue is solved.

Conclusion

Thus, professional training within the practice-oriented environment of the integrated scientific, educational and production structures allows ensuring the required level of the graduates readiness to professional activity in DIC, minimizing educational and social difficulties in adapting to professional environment, expands the participation of students and master students in research, in grant winning, solves the graduates employment issue, creates the conditions for improving the staff quality structure; forms the generalized intellectual-creative space of university life; promotes the development of the system of permanent interaction between the employers and educational community for monitoring regional labor and educational service market, rational filling of business segments on labor market; encourages the employers to invest in educational institutions.

The integration processes promote, in their turn, the formation of the Common Education Space due to the joining information spaces of universities, scientific organizations and production structures, transfer and efficient use of concepts, ideas, principles, knowledge, methods and technologies from some fields to another ones and development of new forms of collective activity.

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