

PEHPP 2019**Pedagogical Education: History, Present Time, Perspectives****DEVELOPMENT OF NETWORK INTERACTION MODEL
“SCHOOL-UNIVERSITY-FACTORY” ON REGIONAL LEVEL**

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Abstract

Nowadays the model of Russian secondary and higher education has been significantly transformed leading to the increase of interest to the formation of practical competences in students. The authors consider the fact that currently the state of pedagogical system being quite conservative is changed only as a result of qualitative shifts of its inner structure so any nonsystematic influence is absorbed and dissipated. The present article is intended to justify a complex approach to train highly-qualified specialists for Russian enterprises that implement network knowledge-competence model as an additional direction. The research made allowed the authors to formulate basic competences being the most important from the viewpoint of staff preparation in the course of innovation economy development. The model of network interaction “School – University – Factory” has been developed. The authors point out that this approach can be successful when many factors such as the level of teachers and tutors qualification, the presence of technological platforms in partnership with specialized enterprises, the creation of intellectual infrastructure. As a result the authors make the conclusion about the practice-oriented approach to teach future specialists based on three components “School – University – Factory” being the efficient one. This system of additional education can help forming innovational thinking of future specialists. The whole process here is aimed at the creating interactive educational environment that develops professional competences, viz. forming the ability to generate innovations; developing innovation culture. This aim, therefore, provides the reliable basis for creation and development of innovation-oriented human resources of Russian industry.

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Keywords: Innovations in education, human resources, military-industrial complex, training, network interaction model, professional orientation.



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1. Introduction

A famous theorist in the field of innovation management, B. Johannisson, singles out five blocks of competences being important for a modern specialists (Table 01): to understand why a person wants to do a certain kind of activity; to know how to do this activity; to know who (i.e. who is important to communicate with for the activity to be efficient); to know what general knowledge and skills are necessary.

Table 01. Competency system of a modern specialist

№ п/п	Competence	Personality
1	To know why?	Readiness for self-giving, risk, endurance, self-confidence
2	To know how?	Professional knowledge and skills
3	To know who	The skill of network communication
4	To know when?	Skills and intuition
5	To know what?	General knowledge, technical knowledge

Points №№ 1 and 4 in a given table are mostly inherent though these skills can be enforced during the process of education. Points №№ 2, 3, 5 are the skills that can be developed and formed in the course of additional education on its different levels – secondary, secondary special and higher education (Maarek, 2000).

The system of education is certain to be continuous. This is the first factor absent in Russia. In case when Russia is compared with English-speaking countries the main difference is the variety of forms and modules of practical education, classes of different kinds including the classes on-site (Frick & Torres, 2002).

The idea about the necessity of practical orientation of future specialists in foreign countries is introduced in secondary school already, further being developed in higher education also. Some countries feature professionally oriented training courses to form the skills in certain useful craft as well as some primary skills and knowledge about future professional activity in students.

The example of such system is Germany which has the system of dual education (high-school students spend 3 days a week at school, 2 days – in large enterprises working together with master teachers) due to which the country has large number of highly qualified specialists capable to do successful professional activity in modern conditions (Kukuk & Stadler, 2000).

Russian universities have largely theoretical direction of study. Less attention is given to forming the skills of team work, establishing communication between educational institutions and employers, i.e. creating favorable conditions for theoretical knowledge received by the students to be transformed into practical skills (Kostrova & Shibarshina, 2019).

The transition of Russian economy to innovation path of its development as well as total digitization form increased the demand for highly-qualified engineers and managers. Defense-industrial complex (DIC) is an important branch of Russian industry which provides the security of our country. At the same time DIC feels sharp necessity in young specialists interested in this field and capable to successfully apply the latest theoretical scientific achievements into practice.

Therefore, the necessity to form such intellectual-creative environment in educational institutions which will allow using individual learning paths, doing innovation and research work, developing the system of network interaction with industrial and scientific organizations of Russia can be seen (Gvozdeva, Kazakova, Lyubimov, & Nesterova, 2017).

2. Problem Statement

Youth is an important resource of our economy development, primarily, in the sphere of innovations. However, high technology production has more success in the field where it is based both on scientific knowledge of students and scientists and their practical skills. Meanwhile, modern conditions witness the trend of specialists outflow from DIC to private business. Simultaneously, young people – graduates from higher professional institutions – are the ones who experience most difficulties to find job, their “first position” (Shibarshina, 2019). These trends must be overcome. Consequently, the pulse of strong dynamic innovation development for students should be one of the most important ones.

To increase the flow of young specialists to DIC enterprises a complex approach based on interaction of academic institutions and industrial enterprises is necessary to be developed. To provide the activity of future specialists three flows should be organized: youth; industrial enterprises that need new young specialists; scientists (Junius, 1997). Having united these three flows in the conditions of the system of additional education the increase of quality human resources in DIC can be made.

3. Research Questions

This article considers the following issues and solves the following tasks facilitating the achievement of research aim:

- problems of human resources preparation for DIC enterprises corresponding to modern requirements are found;
- theoretical approaches to the formation of highly qualified modern specialist are analyzed;
- experience of foreign countries while solving the problems of specialists preparation corresponding to actual needs of society is studied;
- network interaction model “School – University – Factory” the implementation of which is supposed to be carried out on the basis of secondary and higher educational institutions of Ryazan in close collaboration with JSC “Ryazan industrial-engineering enterprise “Granit” is developed;
- effects from implementation of the model offered are found out and described.

4. Purpose of the Study

The main aim of a given research is the development of scientific approach to the creation and formation of the platform preparing human resources for DIC enterprises in Russian universities that implement network knowledge-competence model in their activity as part of additional specialization.

5. Research Methods

In this research the authors make use of the following scientific methods and approaches:

- complex approach to developing the model of introducing young specialists into labor market. Theoretical prerequisites of considering this problem can be found in several methodological approaches, viz. human capital theory, signal theory, market discrimination theory, etc.;
- sociocultural approach in its certain realization as socio-cultural-pedagogical consideration of the problem, the novelty of which is the analysis of socio-economic, cultural and teaching environments;
- the synthesis of nomothetical (research of typological, repetitive phenomena) and ideographic (research of structural interconnections of a phenomenon) as the most effective way to cover typological and individual peculiarities of socio-cultural-pedagogic reality under consideration;
- interdisciplinary synthesis method (application of the results found during the research of different areas of scientific knowledge: sociology, pedagogy, psychology, economic theory) the novelty of which lies in the holistic view of the problem of entrepreneur youth education;
- authors methods of sociological research (questioning) including professional interests of young students adapted for the research.

6. Findings

The transition of Russian economy to innovation way of development as well as total digitization form the increased demand for highly qualified human resources in the field of engineering and managerial specialties (Kostrova, 2017). Defense-industrial complex (DIC) is an important branch of Russian industry which provides the security of our country. At the same DIC feels the sharp necessity in young specialists interested in this field and capable to successfully apply the latest theoretical scientific achievements into practice.

Therefore, the necessity to form such intellectual-creative environment in educational institutions which will allow using individual learning paths, doing innovation and research work, developing the system of network interaction with industrial and scientific organizations of Russia appears (Tuarmenskij, Lyashchuk, & Tuarmenskij, 2018).

Currently JSC “Ryazan industrial-engineering enterprise “Granit” closely collaborates with higher educational institutions of Ryazan region: bachelors and masters have their manufacturing practice, prepare final qualification works.

However, in our opinion, the preparation of engineers and managers for DIC enterprises should begin earlier, while studying at secondary school. At this very time students start to acquire their first professional competences and their introduction into the activity of DIC enterprises or any certain enterprise will allow them to get interested to the work in this sphere, help them to be better oriented in further education and professional development.

Therefore, we offer network interaction model “School – University – Factory” to be developed in Ryazan.

The aim of developing this network interaction program in collaboration with schools and universities is not only the preparation to successful passing Unified state exam, the development of the equalities necessary to continue the education at the university, but also professional orientation of students [36]. The program is aimed at high-school students (10-11 forms), bachelors and masters.

Introduction into network interaction program together with JSC “Ryazan industrial-engineering enterprise “Granit” will surely allow solving the problem connected with the absence of opportunities for self-realization and professional orientation of graduates and, consequently, will be able to considerably increase the quality of future engineers preparation.

All activities aimed at creating network interaction model offered should be held in the following stages:

1. Preliminary stage: preparing all necessary regulatory documents, forming academic groups.
2. Main stage: educating the students.
3. Final stage: evaluating the efficiency of education.

It should be also noted that the activities offered require no expenses for their organization and conduct – material and technical base for classes is present, and the whole list of activities is included into job duties of those people who will directly participate in this project realization.

Program “School – University – Factory” is supposed to include three compulsory directions:

1. programs for in-depth study of certain disciplines;
2. program for organizing research and project activities of students;
3. program for manufacturing practice and internship.

The route of educational classes according to network interaction program “School – University – Factory” for 2019-2020 academic year is given in Table 02.

Table 02. The route of educational classes according to network interaction program “School – University – Factory” for one academic year

Type of classes	Period						
	October	November	December	January	February	March	April
Webinar (leading specialists of JSC “Ryazan industrial-engineering enterprise “Granit”)							
On-site class (leading specialists of JSC “Ryazan industrial-engineering enterprise “Granit”)							

Scientific-research work of students (tutors of JSC “Ryazan industrial-engineering enterprise “Granit”)							
Group project development (tutors of JSC “Ryazan industrial-engineering enterprise “Granit”)							

Therefore, the implementation of network interaction model “School – University – Factory” offered allows solving the following basic tasks:

- creating a complex system of high quality educational services according to Federal state educational standard based on the model of mixed learning and network form of program organization;
- increasing the quality of education by means of enlarging the range and quality of educational services;
- forming and developing subject, meta subject and personal competences of students providing further successful learning and professional development;
- creating the conditions for professional self-determination of high school students and for the development of their personal educational tasks as well as for the employment of graduates;
- facilitating the employment of higher educational institutions graduates;
- learning the technology of mixed education as well as network forms of education by teachers of secondary and higher educational institutions.

Educational model “School – University – Factory” offered is elaborated in accordance with state initiatives in the field of education (introduction of specialized learning, new quality evaluation) as well as with the changes occurring in modern society (the necessity to vary the contents of educational programs, to develop new specialized directions, the variety of educational demands and requests on behalf of students and their parents, national security, etc.).

These effects together with general trends towards changes (differentiation of educational content, changing the system of educational results evaluation, necessity to increase the quality of specialists preparation for DIC enterprises) are considered to be the basis for implementing the model offered.

Among general effects from the implementation of network interaction model we can single out the following:

- different social institutions start active participation solving the problems of education and employment;
- educational environment providing the preparation of competitive specialists starts to develop;
- requirements to the quality of education start to be improved leading to the development of control system to check the execution of these requirements;
- availability of quality education taking into account social order as well the requirements introduced by state educational standards is provided;
- conditions for self-realization and self-determination of students by perfecting open variable educational environment based on principles of continuous character of secondary and higher education and network interaction are created.

We should also note that introducing educational model of network interaction will have complex effect:

1. for students:
 - to receive the education in accordance with their own educational needs, inclinations and abilities;
 - to be able for more qualitative self-determination while choosing their own way in life;
 - to gain skills of practical activity in real production environment (Didkovskaya & Trynov, 2019).
2. for management of educational institutions:
 - coordinating their own initiatives with social order of their immediate environment;
 - ensuring the continuity of secondary and higher education in the system of professional education;
 - coordinating the activity of teaching staff in priority directions of educational institution development;
 - providing the open character of innovation activity shown by teaching staff as well as the evaluation of its results by society.
3. for teaching staff:
 - higher opportunity to realize creativity;
 - the opportunity to upgrade their own teaching and innovation experience;
 - the opportunity for individualized advance training in accordance with personal needs;
 - developing a new structure for evaluating learning outcomes;
 - experience of participation in open events.
4. for JSC “Ryazan industrial-engineering enterprise “Granit”:
 - introducing young specialists as enterprise personnel;
 - selecting best graduates for their further employment at the enterprise;
 - improving the image of the enterprise;
 - introduction and distribution of innovation experience into enterprise activity.

Consequently, the introduction of educational network interaction model “School – University – Factory” will increase the accessibility of quality education; create favorable conditions for students self-determination concerning their major direction of future professional activity.

7. Conclusion

To sum it up, we can list the following results of introduction and implementation of network interaction model “School – University – Factory”:

- creating the conditions for differentiation of high-class students and university students education having wide and flexible possibilities to build individual educational paths for students;
- determining equal access to complete education by different categories of students according to their abilities, individual inclinations and needs;
- enhancing the opportunity to socialize the students, to make them self-determined;
- providing the continuity of secondary and higher education, more efficient preparation of graduates from educational institutions to labor activity;
- elaborating more practical character of education attracting the students to the implementation of socially-oriented academic projects, social practices and research, target programs for professional training oriented at the needs of a certain enterprise.

As a result of this project implementation Ryazan will be the place to host resource and network methodological and innovation center capable to support with information and interaction further efficient management of the system for professional youth preparation.

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