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The Managerial Mechanism of Future Competitive Technical Specialists Vocational Training: The Russian Experience

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ABSTRACT

The relevance of the paper is reasoned by the search for adequate mechanisms to manage vocational training of future competitive technical specialists. Modern economies demand the training of technical specialists' new generation ready to project and engineering, production and technological, organizational and management, science and research, service and operational professional activities, as well as the fulfillment of skilled work using modern equipment for the developed technological process. One of the variants of the organization of vocational training of future competitive technical specialists is based on the integration of educational curricula of different levels (primary, secondary and high). The purpose of the paper is to develop a managerial mechanism for future competitive technical specialists' training based on the integration of educational curricula at different levels (primary, secondary and high). The leading method is the method of action research, allowing obtain new knowledge on the managerial mechanism for vocational training of specialists, capable of a certain type of practical activities, self-organization and competitiveness on the labor market through the integration of primary, secondary and high levels of educational curricula. The article defines the essence of integrated educational curricula of primary, secondary and high levels of vocational training; it justifies the organization of control and assessment procedures of students' vocational training through the integration of educational curricula at different levels; proposes an algorithm of students' selection to study on integrated educational curricula. Paper Submissions can be useful for research and teaching staff of technical specialists' vocational training system, experts of training and retraining centers in the training content's selection and structuring of research universities' scientific and pedagogical staff development.

Keywords: Integration, Levels of Vocational Training, Management, Technical Specialists
JEL Classifications: A23, I23, I26

1. INTRODUCTION

1.1. The Relevance of the Study

In the modern world the national security and independence of states cannot be separated from the level of their technological development. The role and importance of each country in the world economy are in direct dependence on the degree of availability of its high technology. The level of development of high technologies nowadays is a description of the economic status and the scientific-industrial potential of the country. At the same time, the rapid development of science and technics, the rapid change of one technologies with another ones, the growth of innovative processes in the sphere of manufacture and business result in the need to continuously update professionals' knowledge and the continuous improvement of the quality of their training (Gorin et al., 2010; Ivanov et al., 2014; Lipaev et al., 2010; Alekseeva et al., 2015). The economy demand the training of technical specialists' new generation ready to different types of professional activities, as well as to the implementation of highly skilled work using modern equipment for technological processes (Lunev and Pugacheva, 2013; Masalimova et al., 2014; Khairullina et al., 2016; Zaripova et al., 2014). One of the variants of the

organization of specialists' vocational training at the Technical University is based on the integration of educational curricula at different levels (primary, secondary and high) (Lenskaya, 2015; Ivanov et al., 2014; Ibragimov et al., 2015). The purpose of the article is to develop a managerial mechanism of future competitive technical specialists' vocational training based on the integration of educational curricula at different levels (primary, secondary and high).

1.2. The Essence of Vocational Training Curriculum

The essence of vocational training curriculum is to ensure the quality of implementation of the state educational standard in the training direction and includes educational curriculum, work curricula of academic disciplines, regulations on the control of the quality of training, curricula of educational and practical training, calendar training schedule and methodological developments (Protas, 2013; Barabanova and Ivanov, 2012; Mishchenko et al., 2014).

1.3. The Essence of Vocational Training

The essence of vocational training includes the system integrity of the integrative interaction of institutions of professional education, science and industry, aimed at future competitive specialist's development in the labor market (Tataru, 2007).

1.4. The Structure of Vocational Training

It is established that there are three levels in the structure of vocational training: Primary, secondary and high. Vocational training at all levels should ensure the students' mastering of profession and relevant qualifications (Saurenko, 2009). For vocational schools' graduates enrolled by the curricula of the primary level the set of necessary knowledge and competence is determined by the performance requirements of skilled labor using the modern equipment on the developed technological processes. Vocational schools' graduates enrolled by the curricula of the secondary level is a practically - oriented specialist the set of knowledge and competencies of which allow to provide administrative and technical support for the processes of management of production, complex engineering, technological and information systems, participate in their design. For vocational schools' graduates enrolled by the curricula of the high level, the set of knowledge and competences makes it possible independently to develop complicated technical, technological and information systems, to organize and manage production.

2. MATERIALS AND METHODS

2.1. Methods of the Study

During research the following methods were used: Analysis of normative documents, the action research method, expert evaluation method, observation and questionnaire.

2.2. Experimental Base of the Study

Experimental work was carried out on the basis of Kazan national research technical University n. a. A.N. Tupolev of Tatarstan Republic in Russia. In the experimental work participated 262 teachers, 410 students, 83 University and its structural subdivisions' heads.

2.3. Stages of the Study

The study was conducted in three stages:

- On the first stage of the study the current state of the problem in the literature and practice of education's management was analyzed; a research program was developed;
- On the second stage the managerial mechanism of vocational training at the Technical University was developed on the basis of integration of educational curricula at different levels (primary, secondary and higher education);
- On the third stage, the systematization, interpretation and synthesis of the research results were carried out; theoretical conclusions were refined; processing and registration of the results of the study were performed.

3. RESULTS

The main results of this study are: (1) Integrated educational curricula of primary, secondary and higher levels of vocational training; (2) a monitoring and evaluation procedures of students' vocational training based on integration of educational curricula of different levels; (3) algorithm of students' selection to train in technical University on the integrated educational curricula.

3.1. The Essence of Integrated Educational Curricula of Primary, Secondary and Higher Levels of Vocational Training

It is established that the essence of the integrated educational curricula of primary, secondary and higher levels of training consists, first, in the optimization of its structure and content, in order to train competitive professionals ready for different types (project-design, production-technological, organizational-managerial, science-research, service- operational) of professional activities and the implementation of highly skilled labor using modern equipment for technological processes, secondly, in the alternative training of reservists for the Defense Ministry.

3.1.1. Educational curricula of the primary level of vocational training

It is found that the essence of the educational curricula of primary training is to ensure the needs of production in highly skilled workforce and meeting the needs of students in professional and life self-determination. This leads to: The elimination of gaps and unnecessary duplication in the process of vocational training of workers taking into account labor market needs; development of mechanisms for the participation of employers in the process of vocational training of workers. It is found that graduates mastered the educational curricula of the primary training level are ready to perform skilled labor using the modern equipment on the developed technological process.

3.1.2. Educational curricula of secondary level of vocational training

It is found that the essence of the educational curricula of secondary level of vocational training is to meet the needs of the regional economy for highly qualified mid-career professionals by providing advanced nature of the educational content and taking into account the personal interests of students. A graduate mastered the educational curriculum of a secondary level of

vocational training is a practically-oriented specialist, providing administrative - technical support for the processes of production management, complex engineering, technological and information systems and able to participate in their projecting. To achieve this goal, mechanisms are developed of specialists' target contract training and integration of educational curricula on primary and secondary levels of training.

3.1.3. Educational curricula of higher level of vocational training

It is found that the essence of the educational curricula of the higher level of professional training is to meet the needs of innovative development of regional economy in specialists, capable independently to develop complex technical, technological and information systems, to organize and manage production. With this purpose, the integration of the university and industry is developed, innovative competence-oriented educational curricula projecting is organized. Educational curricula at each level of vocational training include disciplines of natural science, general technical and vocational cycles. It is established that the management feature of vocational training of students that mastered the integrated educational curricula of the highest level, consists in the study organization by 1st-year students of conjugated disciplines of the scientific, general technical and professional cycles from educational curricula of higher, secondary, and primary levels of vocational training.

3.1.4. Preparation of reservists for the defense ministry

It is found that vocational training on the integrated educational curricula of primary, secondary and higher levels can be considered as an alternative to the training of reservists for the Defense Ministry. Since 2014 on the basis of civilian universities the system of reservists' preparation for the Defense Ministry started to work aimed at changing of basic military training system and allowing the students while their study at the technical University to receive a full military profession and military service certificate of a soldier or a reserve Sergeant with the appropriate mark on his/her service had. Students wishing to master the military profession in the University instead of the service in the Army, take 450 h of theoretical training and 3-month military training. It is found that among the students there are those who: On health indicators are not fit for military service; have a delay, as temporarily unfit; in accordance with current Russian legislation wish to use the right to replace military service in the Army with alternative civil service; and in the number of students there are girls, which a priori can't be drafted into the Russian military service. In these circumstances, the organization of vocational training process through the integration of primary, secondary and higher levels can be considered as an alternative to the training of reservists for the above mentioned categories of students and implemented within the allotted hours for it.

3.2. Monitoring and Evaluation Procedures of Students' Vocational Training Through the Integration of Educational Curricula of Different Levels

It is clarified that the organization of control and evaluation procedures of students' vocational training is based on a point rating system. Point-rating system provides for the use of the various test materials (tests, technical specifications, etc.), allowing to define a rating of the student in each discipline and provide a diagnosis of mastered competencies. It is established that the rating of a student is an individual cumulative index obtained according to the results of study in the semester. Assessment of knowledge, skills and competencies of the student using the rating implies that the educational, scientific-research work in each discipline during the semester and during the session is reflected in the final total score from 0 to 100 points.

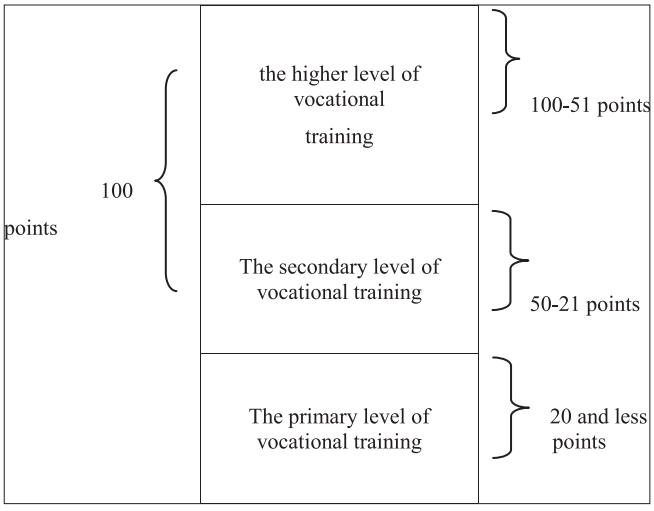
3.2.1. Organization of students' vocational training who scored from 51 till 100 points

It is found that in the 1st year of study, students who scored by the point-rating system from 51 to 100 points, have the ability in the framework of curricula of additional professional education during the third and fourth semesters master educational curriculum for primary vocational training (11-13 h per week) and to get a certificate of a qualified machine operator (turner, milling machine operator). In this case the industrial training necessary to obtain a worker's qualification and can be carried out during educational and industrial practices, as well as in the framework of additional vocational education (Figure 1). In the 5th and 6th semesters in the framework of additional education, these students can master the educational curriculum of the secondary level of vocational training, to prepare and successfully defend a graduate qualification work and get qualification of a technique worker (diploma of secondary vocational education). Each session, students should confirm their rating to continue training at the higher level of vocational training.

3.2.2. Organization of students' vocational training who obtained from 50 to 21 points

It is found that the students with rating, which is not relevant to the level of higher professional education in the 1st year of study (from 50 to 21 points) are offered to master the educational curriculum of the secondary level. It was found that the students rated, the relevant level of higher professional education in the 1st year of study (from 50 to 21 points), it is proposed to transfer to the secondary education program level training. During the third

Figure 1: The relationship of levels of vocational training and point-rating system of control



and fourth semesters these students within the curriculum study of secondary level of vocational training receive the worker's qualification of the machine operator (turner, milling machine operator). In case of successful training on the 5th and 6th semesters, and the preparation and protection of final qualifying work, these students receive the qualification of technician (diploma of secondary vocational education).

3.2.3. Organization of students' vocational training for those who had 20 points and below

It is found that students with a rating of 20 points and below, which can be found on any interim attestation, are encouraged to be enrolled for study only on curricula of primary vocational training. They have recertification on successfully mastered disciplines of educational curricula of higher or secondary level of vocational training. This variant of the organization of students' vocational training, with 20 points and below can be regarded as the guarantee of their constitutional right for education.

3.3. Algorithm of Students' Selection in Technical University for Training on the Integrated Educational Curricula

It is found that the recruitment of applicants can be carried out for training on educational curriculum of: a) Higher level of vocational training, integrated as with the system of reservists' training, so the educational curricula of primary and secondary levels; (a) secondary level of vocational training, integrated with the curriculum of primary level and consistent with the integrated educational curriculum of the higher level; (b) primary level of vocational training, consistent with the integrated educational curriculum of secondary level of vocational training.

The applicants failed in the competition for training on the curriculum of higher-level of vocational training are given the opportunity to be entitled to participate in the competition for secondary education curriculum.

Accordingly, the applicants failed in the competition for training on curriculum of secondary level of vocational training are entitled to participate in the competition for teaching at the primary level.

In this scheme, for applicants participating in the competition to study on the curriculum of the higher level of vocational training, the attractive opportunity is to obtain either a full military profession and military service certificate of a soldier or a reserve Sergeant with the appropriate endorsement on his/her service, or diplomas of higher and secondary vocational education and worker's qualification.

For applicants participating in the competition to study on the training curricula of secondary and primary levels of vocational training, the attractive opportunity is to receive a diploma of secondary vocational education, worker's qualification, and the ability to continue studying in the same University for obtaining of higher or secondary vocational education in the reduced terms.

Thus, applicants can enter the same University at different levels (higher, secondary, primary) of vocational training in one specialty.

3.4. Stages of Realization of the Managerial Mechanism of Specialists' Vocational Training at the Technical University on the Basis of Integration of Educational Curricula of Different Levels

Implementation of the managerial mechanism of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels suggests the following experimental stages: Ascertaining, forming and control.

3.4.1. The ascertaining stage

The purpose of ascertaining stage is to identify teachers, 'students,' the University and its structural subdivisions leaders' attitude to the management of specialists' vocational training based on the integration of educational curricula of different levels. At this stage, from the number of teachers, students, leaders of the University and its structural subdivisions the target groups were created for the implementation of the managerial mechanism of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels. The target groups developed special curricula that included activities and timelines.

3.4.2. The forming stage

In the framework of the forming stage integrated curricula of primary, secondary and higher levels of vocational training in a direction "Design and technological ensuring of engineering industries" were developed and implemented.

3.4.3. The control stage

In the control stage the analysis of the effectiveness of vocational training based on the integration of educational curricula of different levels was made. It is established that the organization of vocational training based on the integration of educational curricula of different levels provides: (1) Sustainable interaction of technical University, science and production; (2) the needs' satisfaction of the regional economy in workers and professionals with a combination of knowledge and competencies that can not only perform a specific employment function in the contemporary information-technological environment, but also to develop it in relation to a specific project, to discover and state problems, to solve non-standard tasks, be ready for the lifelong learning and be competitive in labor market.

4. DISCUSSIONS

Important theoretical and practical significance for study have the works of Lenskaya (2015), Loschilova (2014) about the organization of educational institutions, implementing educational curricula of different levels of education. The essential characteristic of the integrated educational curriculum for specialists' training is given in the publications of Gorin et al. (2010), Protas (2013), Works of Tatarinova et al. (2012) on the integration of levels of vocational training as an industrial cluster are also interesting for study. The mechanism of continuous vocational training on integrated curricula is disclosed in scientific papers of Saurenko (2009), Tataru (2007). Integration of levels of vocational education as a component of pedagogical strategizing

in a technical University is revealed in the works of Lunev and Pugacheva (2013, 2014); Shaidullina et al. (2015a, 2015b).

However, the analysis of scientific works shows that the problem of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels has discussion character. In special literature the question of the managerial mechanism of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels (primary, secondary and tertiary) has not been solved.

5. CONCLUSION

It is established that the managerial mechanism of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels includes: (1) The development and implementation of integrated educational curricula of primary, secondary and higher levels of training to prepare competitive specialists for professional activities and the implementation of highly skilled labor using modern equipment for the developed technological processes; (2) the organization of control and evaluation procedures of students' vocational training based on a point rating system; (3) algorithm of students' selection for training at the technical University on one specialty, but on educational curricula of different levels.

The paper submissions can be useful for research and teaching staff of technical specialists' vocational training system, experts of training and retraining centers in the training content's selection and structuring of research universi ties' scientific and pedagogical staff development.

Taking into account the obtained results of this study a number of research problems and promising directions that require further consideration can be allocated: Scientific and methodological support of the development and implementation of integrated educational curricula of vocational training; organization of network cooperation of technical universities and enterprises with the aim to enhance the quality of vocational training; the creation of algorithm of employers' involvement in the content and structure defining of vocational training; the establishment of relations between the management of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels and the development of regional spheres of professional educational services; development of mechanism to evaluate the quality of training by the independent expert commissions on tests made in cooperation with employers; certification of graduates' qualification characteristics with the participation of the social partners; the managerial mechanism of students' practice on modern equipment in industrial environment.

6. RECOMMENDATIONS

It is found that the management efficiency of specialists' vocational training at the technical University on the basis of integration of educational curricula of different levels (primary, secondary and higher) will be improved by involving employers to the content's selection and structuring of vocational training.

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