

Chapter 13

Technical Training of Teachers of Vocational Education in Higher Educational Institutions



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13.1 Introduction

The quality of the higher education and implementation of the principles of “formation of the leading knowledge system”, “science-based education” and “lifelong learning” are the platforms of change that are taking place now in the national education systems. The modernisation of the education system of the Republic of Kazakhstan (RK) is directly aimed at the global integration and recognition of the education-specific documents of the Republic of Kazakhstan by the international community.

The training of the highly skilled and sought-after specialists directly depends on the level of competence of the teacher, i.e. his/her professional and pedagogical education and abilities to arrange the educational process and to educate trainees for the professions, which meet the requirements of the modern labour market. This person must be able to perform the overall technological and special professional tasks and have strong fundamental knowledge and skills.

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The training of teachers of vocational education remains the complicated academic and research challenge consisting of the humanitarian, social, psychological and pedagogical, industrial (business skills) and general engineering (in one of the narrow profiles) components. Each component is a separate issue of the relevant sciences. An integrative structure of the activity of a teacher of vocational education questions a priority component (engineering or pedagogical), both in the activity and in the training of engineering and teaching staff.

The study of Udartseva states that essentially a teacher of vocational education is a specialist, naturally combining the quality of a highly skilled worker and a professional teacher, who, along with the psychological and pedagogical competences, is equipped with the technological competencies (Udartseva et al. 2014). The higher educational institution has studied the experience of training specialists for the system of technical-vocational education for the purpose of developing innovative models for technical training of Bachelor of Vocational Education. At present, it is important for the development of the Republic of Kazakhstan and the modern production.

Today the pressing issue is to train a teacher of vocational education of the new formation, capable to organise and to manage educational activities with high quality aiming at training of personnel for the accelerated innovative industrialisation, organising vocational activity for improving efficiency of educational services, easily adapting to the modernisation of the education system, upgrading its content and improving the quality (Smirnova 2016).

13.2 The Analysis of the Education Systems of Bachelor of Vocational Education

A comparative analysis of the educational standards of the higher educational institutions and model curricula for the specialty “vocational education” was carried out for the purpose of searching for an effective training system of teachers of vocational education:

- Kazakhstan (2012 and 2013)
- Russia (2011 and 2014)
- The Republic of Belarus (2013).

The following criteria have been defined as the comparative features: field of education, standard period of study, professional qualification (degree), workload in hours and/or in credit units by cycles, components and parts.

The training duration in all standards is 4 years, in the Republic of Belarus – 5 years. In Kazakhstan and Russia, after studying in the bachelor’s programme (4 years), the alumni have the opportunity to continue their studies in masters’ programmes (2 years). In the Republic of Belarus after graduating from the specialist programme, the alumni have the opportunity to study in master’s programmes (2 years), i.e. a master’s programme is the highest level of university education too.

The training standard of the Republic of Belarus defines in details the tasks of professional activity, professional competence and requirements for each field of study. Russia and Kazakhstan have standards on “vocational education (branch wise)”, and the standard of the Republic of Kazakhstan (2012) is unified for all specialties according to the levels of education, and a field of education is determined by the university itself.

While formulating a specialist’s qualification (degree), all standards under a graduate mean “Bachelor of Vocational Education”, and in the Republic of Belarus, it is a teacher-engineer (for graduate of a specialist programme).

To analyse the training workload, we indicate the following:

1. Kazakhstan (all standards): a model curriculum includes four components and is divided into the cycles: general education courses (GEC), basic courses (BC) and major courses (MC). Each cycle has compulsory and optional components. Besides, the cycle of “additional types of training” (ATT) is also included. They are physical training, internship and the intermediate state control.
2. Russia (2009, 2011): a typical curriculum includes six components and is divided into the cycles – humanitarian, social and economic, mathematical and natural science and professional. Each cycle has a basic and a variable part. Besides, it includes physical training, practical training and on-the-job training and the final state attestation.
3. Russia (2014): significant changes were introduced in the curriculum structure (three components) – block 1 (theoretical training), basic and variable parts; block 2 (practice), variable part; and block 3, the final state attestation.
4. The Republic of Belarus (2013): the most detailed structure of the typical curriculum (12 components) – three cycles of courses – social and humanitarian, natural science and general professional and special disciplines; implementation of term projects (papers); optional subjects; physical training; additional types of training; getting blue-collar profession; practice; examination period; final attestation, 3 weeks; and graduate thesis, 10 weeks.

Thus, all curricula include both theoretical and practical training and final attestation. The typical curricula have the aggregative structure: Kazakhstan (all years), four components, and Russia (2014), three components.

It should note the other side of the state standards and analyse it, i.e. the sections that describe the scope and types of activities of the graduates, as well as the competences, which should have a Bachelor of Vocational Education.

To develop an effective structure for training of engineering and pedagogical personnel for the system of technical and vocational education considering the modern trends of industrial-innovative development of Kazakhstan, we will analyse the training quality of specialists according to the State Compulsory Educational Standard (SCES) of the Republic of Kazakhstan based on innovative approaches.

The main area of activity of a graduate in all standards is the sphere of education. Moreover, the standard of Russia provides a more detailed description compared to the standards of Kazakhstan and Belarus. The distinctive characteristics are the

spheres of the graduate's activities, indicated in the standard of Belarus: the work in the field of machinery production.

The analysis of the objects of professional activity indicated that the standards of Russia and Belarus define the objects as the education process and education plus production processes, respectively. The standard of Kazakhstan describes the objects through educational institutions that, on the one hand, cover the diverse educational institutions and, on the other hand, limit the selection of the actual object of the graduate's work.

An important characteristic of the graduate's activities is the types of professional activities that are directly related to the determination of the list of subjects to be studied and their content for the formation of competencies of future professionals.

The Kazakhstan standards have contradictions in the description of the types of professional activities of a bachelor, namely, the types of professional activities include the following:

- Education (teaching and educational, pedagogical)
- Organisational and technological
- Project-related
- Scientific research.

Further, the standard describes the common tasks of the professional activities of a bachelor, which are designated in accordance with the types of the professional activities:

- In the field of educational activities
- In the field of experimental and research activities
- In the field of organisational and administrative activities
- In the field of socio-educational activities
- In the field of instructional and pedagogical activities
- In the field of educational and technological activities.

To have an objective assessment and analysis of the scope of activities, we have taken the routine tasks of professional activities, which do not contradict the described types of professional activity in the standard of the Republic of Kazakhstan.

The foregoing outcomes allow us making the following conclusions. First, the requirements to the level of education of the standard of Kazakhstan SCES 2010 do not pay sufficient attention to the production and technological training of a teacher of vocational education. Secondly, the standard of Kazakhstan SCES 2010 has the inconsistency related to the requirements for the level of education and the requirements to the training outcomes, in particular: a Bachelor of Vocational Education must be able to operate a modern technological equipment at the level of work qualification of the third degree, which is not reflected in the requirements to the training outcomes. Third, the requirements to the professional competence according to the type of activity in the field of educational and technological activities do not reflect the demand to the level of education in the field of "exploitation of modern technological equipment at the level of work qualification of the third degree".

Thus, the standard of Kazakhstan SCES 2010, the specialty 5V012000 – Vocational Education – has inconsistency in the description of the skills requirements for a teacher of vocational education related to operating modern technological equipment at the level of work qualification of the third degree. In addition, the requirements for formation of production-technological component of the activities of a teacher of vocational education are not fully and clearly written. This is a significant shortage in view of the above analysis and conclusions made while studying the requirements of modern production in the conditions of innovative development of the Republic of Kazakhstan in training of engineering-pedagogical personnel for technical and vocational education system.

It should be noted that there are no fundamental differences in the training of Bachelor of Vocational Education in the specified countries. They just distinguish the training components (socio-humanitarian, general technical, psychological and pedagogical, technical and technological (engineering) and operating skills). However, the approaches to formation of competencies are different, which are determined by the requirements and structure of the regulatory and planning documents.

From the above named, we can conclude that the provision of quality training of personnel with higher education for all areas of activities can be combined to the system. This system is to be provided with the high level of qualification of the teaching staff of the universities, the compliance of the legal and planning documents (including SCES) with the requirements of employers operating in the conditions of industrially innovative development of Kazakhstan and the efficient management of the educational institution.

13.3 The System of Technical Training of Bachelor of Vocational Education in the Context of Dual Education System

The next stage in designing the system of technical training was the questionnaire survey of the employers (directors of colleges and managers of industrial enterprises) about the need in including the elements of dual system in the training of teachers of vocational education (Ikonnikova et al. 2016).

The analysis of the system of training of teachers of vocational education was presented above. The requirements to a graduate laid at the level of educational institution, which develops the training and planning documentation. The modern production makes the new demands on the quality of training of specialists, which must correspond to the industrial-innovative development of Kazakhstan. What are the main criteria for working in huge factories? Do the competences, reflected in the regulatory and planning documents, meet the requirements of the modern production?

To address these issues, we have conducted a questionnaire survey of employers of the machine-building enterprises of the city of Ekibastuz and directors of the colleges.

The competent specialists of these enterprises were requested to rank the selected competences of future specialists according to the regulatory documents and to assess the importance of the subjects chosen by the higher educational institutions to build competences of graduates in the specialty “vocational education”. Based on the above analysis made, we will focus on the technological part of training of teachers of vocational education (engineer-teacher) and mark out the professional subjects and special competences of the technological training. On the other hand, exactly the employees of industrial enterprises can most accurately assess such types of competences.

The purpose of the questionnaire survey is to identify the importance of the level of competence reflected in the regulatory planning documentation of the higher educational institutions for forming the industrial-technological component of the activities of teachers of vocational education (mechanical engineering is defined as the study field). To have clarity and systemacy of the general idea, the questionnaire suggests a scheme for formation of competencies and scope of activities of the teachers of vocational education.

It was proposed to rank the competences of future teachers of vocational education in mechanical engineering, which were extracted from the regulatory documents and aimed at establishing production and technological component according to the following system:

T – (theoretical training), if for the formation of the high-level competences, the conditions of the educational institution are sufficient.

TP – (theoretical and practical training), if for the formation of the high-level competences, the theoretical training in the institution will be ineffective without a practical training in a manufacturing enterprise.

The enterprise specialists were requested to put any mark in the appropriate column of the questionnaire with regard to the evaluating competences.

While developing the questionnaire, we have distinguished the subjects that form the production and technological competences (with a breakdown of each subject), as well as the relevant practices, defined by the universities such as the Karaganda State Technical University (KarSTU), the Pavlodar State University (PSU) named after S. Toraigyrov, the Russian State Vocational and Pedagogical University (RSVPU) and the Belarusian National Technical University (BNTU).

The data of the questionnaire were processed, and the results were presented below.

In the opinion of 50–75% of the specialists that the enterprise conditions would be more effective in case of possessing the competences, we have the results according to the above list of the higher educational institutions: 19%, 36%, 41% and 20%.

In the opinion of 75–100% of the specialists that the enterprise conditions would be more effective in case of possessing the competences, we have the results according to the above list of the higher educational institutions: 14%, 33%, 29% and 53%.

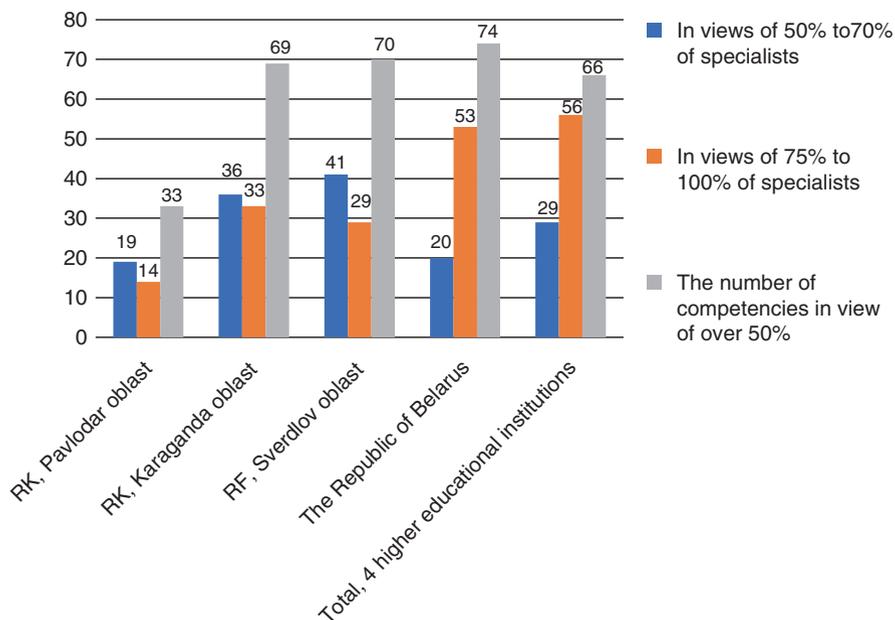


Fig. 13.1 The scope of competences, the formation of which is efficient in the context of actual production

If taken into account the views of more than half of the respondents, then theoretical training in the institutions will be ineffective without a practical training in a manufacturing plant for forming a high level of competences. Such competences by the universities revealed 33%, 69%, 70% and 74% according to the proposed order of the higher educational institutions. Besides, PSU has low percentage, while the other three universities have approximately the same percentage of competencies against the reflected ones. According to the experts, it is more effective to build competences under the conditions of actual production. For illustration purposes, we will show the results of the survey in the diagram (Fig. 13.1).

In general, according to more than half of specialists of the enterprises of the machine-building industry, 66% of the competences reflected in the regulatory planning documentation of the considering countries should be formed under the conditions of real enterprises in order to train teachers of vocational education with good knowledge of technological and productional realities.

The analysis of the outcomes of the employers' survey reveals the competences, the formation of which is only effective in the context of the enterprises, that is, 100% of the respondents have put the corresponding marks. For example, the following competencies were allocated for PSU: the ability to express thoughts on the use of constructive solutions in the field of mechanical engineering, the technical and technological abilities and skills according to the educational path, the skills for operating modern technological equipment at the level of work qualification of the

third degree, the skills in selecting the optimal methods and the skills in improving the basic technological processes of production, including designing executive programmes, evaluating the impact of technological factors on the quality of parts and others.

The dual bachelor programme has a special interest in the phase of searching for the suitable learning technologies for the formation of production-technological competences of Bachelor of Vocational Education. Essentially, the dual form means parallel learning in the educational institutions and in the workplace. The required competence is attained in the dual programmes through a special connection of theoretical training at the university and practical consolidation of the theoretical materials in the enterprises (Erahtina et al. 2015).

The educational institutions experienced in implementing a dual form of education confirm that such training method helps to get a decent education; provides both, the knowledge and skills; and guarantees the employment; it aims to help adapting in the enterprise and self-realisation of the graduates in their professional activities, and an enterprise gets the qualified experienced professionals after completion of the education.

13.4 Conclusion

Thus, the current model of training of Bachelor of Vocational Education must necessarily include elements of the dual training. To this end, since 2015, the higher educational institutions of the Republic of Kazakhstan need to conduct over 50% of training sessions in the relevant industry enterprises. So, the majors in the Karaganda Technical University – “theory of cutting”, “technology of mechanical engineering”, “technological equipment of mechanical engineering”, “standardisation and technical measurements” and “metal-cutting tools” – are being conducted in the machine-building plant №1.

Establishment of the applied qualification centres is another important step towards the improving of the training model of teachers of vocational education (Gotting et al. 2016). The lessons at the centres are completed by taking qualification exams to get a work qualification. The performance analysis showed that the students studying the subjects in the context of enterprises have higher scores on these subjects, as well as higher level of technological competences.

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