

The Model of Monitoring of Vocational Pedagogical Competences of Professors in Secondary Vocational Education

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ABSTRACT

The relevance of the researched issue is preconditioned by the strategic changes in the secondary vocational education system taking place not only in Russia, but also in majority of industrially developed countries. Provision of the system with qualified pedagogical staff is the leading strategic objective of development of the secondary vocational educational system. Its solution must be based on the justified monitoring system, which objectively represents the condition as well as quantitative and qualitative changes taking place in the educational sphere. The article is aimed at developing, substantiating and approbating the model of monitoring of vocational pedagogical competences of professors in secondary vocational education. Integration of the competence, functional and general pedagogical analysis became the leading approach to research into this problem, which has enabled substantiating the model of monitoring of vocational pedagogical competences of professors in the secondary vocational education system. The article presents results of the theoretical and methodological analysis of Russian and foreign research dedicated to identification of key and emerging competences in various spheres. The competence model of a professor of secondary vocational education has been developed and substantiated as a monitoring basis. The article may be useful to improve the quality of the human resource potential in the secondary vocational education system in Russia, to define current and long-range objectives of its development.

KEYWORDS

Competences, competence model of a professor, emerging competences, key (basic) competences, monitoring model

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Introduction

New guidelines for the secondary vocational educational system of Russia were established by the Strategy for Developing the Regular Labour Force Training System and Forming Applied Qualifications in the Russian Federation for the Period until 2020 (*approved by the Board of the Ministry of Education and Science of the Russian Federation (minutes dated 18 July 2013 No. ПК-56Н)*) and the Set of Measures Designated for Improvement of the Secondary

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Vocational Education System for 2015 – 2020 (approved by Resolution of the Government of the Russian Federation dated 3 March 2015 No. 349-p). Revision of the contents of secondary vocational education system and introduction of contemporary techniques and technologies will be the main development trends of the secondary vocational education system in the nearest five years. In 2016-2017, federal state educational standards of secondary vocational education will be developed and updated. Standards included into the list of 50 most demanded emerging professions requiring secondary vocational education will be the main priority in this work.

The main sources of updating of the federal state educational standards of secondary vocational education will be 800 occupational standards developed by the Vocational Qualification Boards and approved by the Ministry of Labour and Social Protection of the Russian Federation, as well as qualification requirements and *WorldSkills* training techniques in 55 competences. According to Olga Golodets, the Vice-Prime Minister of the Russian Federation (2016), improvement of quality of secondary vocational education grants access to many professions which used to require higher education.

The Strategy for Developing the Regular Labour Force Training System and Forming Applied Qualifications for the Period until 2020, which establishes principal trends of the government policy for training qualified workers (employees) and mid-ranking specialists in the Russian Federation in the long term, emphasizes both the quantitative and qualitative gap between the needs of the economy for regular labour force and mid-ranking specialists, their actual availability and conformance of their qualifications with the employers'/labour market requirements (the gap is from 30 to 70% of the need depending on the industry). This problem is especially pressing in the innovation sector and highly-tech enterprises.

In order to ensure conformance of graduates' qualifications to the needs of the economy, a set of measures including establishment of conditions and mechanisms for providing the secondary vocational education system with qualified pedagogical staff is planned to be adopted.

According to the scientific research data, more than 70% of pedagogical staff in vocational educational establishments comprises specialists with higher vocational education, but without any vocational pedagogical training. However, broadness of vocational pedagogical activities of a professor of the secondary vocational establishment under current conditions assumes a full set of requirements for a professor as to a process engineer and a manager of the educational process. At present the level of a professor's vitagenetic and situational pedagogical experience is not enough to solve the vocational pedagogical objectives (Zeer, 2013; Zeer& Streltsov, 2016; Dorozhkin et al., 2016).

Moreover, the requirements for the pedagogical element of vocational training of a professor in the secondary vocational education system are regularly increased. The significance of pedagogical training and balanced production and pedagogical systems of professional competences is growing. Innovative development of economy and modernization of production require increased qualifications of teaching staff in the vocational education system in the area of new technologies.

Works of many researchers, including Russian ones, are dedicated to vocational training of a professor in the secondary vocational education system, competence modelling and methodology of competence assessment, including: F.F. Dudyrev (2016), E.F. Zeer (2013), G.M. Romantsev (2007), V.A. Fedorov

&F. T. Khamaturov (2010), P.G. Shchedrovitsky (2016), N.N. Davydova et al. (2016) etc.

Implementation of strategic objectives of human resourcing of the secondary vocational education system must be based on the substantiated monitoring system representing the condition as well as qualitative and quantitative changes taking place in the sphere of education. Introduction of indicators complying with international requirements is of critical importance. Taking into account provisions of the strategy, human resourcing of the secondary vocational education system must be monitored so that the range and level of competences of pedagogical staff, knowledge needed by the economy both at the current development level in Russian and in the longer term until 2020 can be identified.

The goal of the proposed research is to develop, substantiate and approbate the model of monitoring of vocational pedagogical competences of a professor in the secondary vocational education system.

The significance of the research is that implementation of its results will enable developing a substantiated approach to setting urgent and long-term objectives of human resource potential development of the secondary vocational education system, forming optimum forms of psychological pedagogical support of pedagogical staff in the secondary vocational education system.

Methodological Framework

Human resourcing is one of the main indicators characterizing operation and development of vocational educational establishments. Information on this issue is traditionally collected within the statistical framework once a year. In the current context the indicators, form and regularity of data provision under the applicable forms fail to meet the interests both of educational establishments and education regulatory authorities. The obtained information does not allow satisfying the needs of the professional community in the information objectivity.

Tasks of management and further development of vocational educational establishments need annual and even quarterly monitoring of human resourcing. At present monitoring is treated as regular and continuous observation of a process in order to identify whether it conforms to the expected result or basic requirements. Within the framework of tracing changes of human resourcing of vocational educational establishments monitoring is a system for arranging collection, storage, analysis and provision of human resourcing information which enables forecasting their development and making timely and substantiated operating management decisions.

As human resourcing monitoring pertains to the most complex and multi-factor human resource processes, it is studied and arranged taking into account opinions of scientists of different professions: managers, economists, psychologists, pedagogues, sociologists and lawyers.

When it comes to the research objectives, monitoring is considered as an organizational and analytical method of studying the condition of human resourcing in vocational educational establishments of the same level (secondary vocational education). Monitoring structure and scope: data collection within the framework of human resourcing monitoring is object-focused and directed at professors of special disciplines.

The following must be determined to monitor human resourcing: target of research; research methods; monitoring indicators; source of information; experts; information recipient and the format of decisions to be made on the basis of the monitoring.

The monitoring of arrangement and conducting of the monitoring shall be based on the following principles:

- Complementarity, i.e. integration of results of the respondent survey and factor analysis;
- Objectivity based on using expert opinions of different respondent categories (head, resource specialist, graduate);
- Authenticity, which provides for using statistical methods;
- Adequacy, aimed at research, study of domestic and international experience when forming and using human resource potential.

The combination of terms “human resourcing monitoring” shall be considered as a regulatory mechanism of formation and improvement of use of the potential of heads and specialists of vocational educational establishments. In this research, the following restriction was introduced: professors of special disciplines are the monitoring object (which may also be a monitoring subject).

Results

Non-conformance of training results, i.e. competences, which have been actually obtained by graduates, to demands to the contemporary fast-changing labour market is the most pressing problem of vocational education. This problem is found not only in Russia. Most industrially developed European countries lack qualified regular labour force, mainly due to imperfection of existing vocational education systems which undergo permanent reformation (Kutepov, 2015).

Efficiency of solution of human resource training objectives for the developing economy by the vocational education system is defined by the ability of its own human resource to improve its competences: to study advanced equipment and new production technologies, to create and use contemporary educational technologies, and to be flexible on the educational services market (Ashmarina et al., 2016).

The monitoring is based on the competence model of a professor of the secondary vocational educational establishment. Basic requirements for the model include its conformance to the structure of the vocational educational standard and representation of social and economic development tendencies in the structure thereof in the form of inclusion of emerging competences. The basis of the competence model of a professor is a competence model of a specialist (blue-collar jobs) (Figure 1).

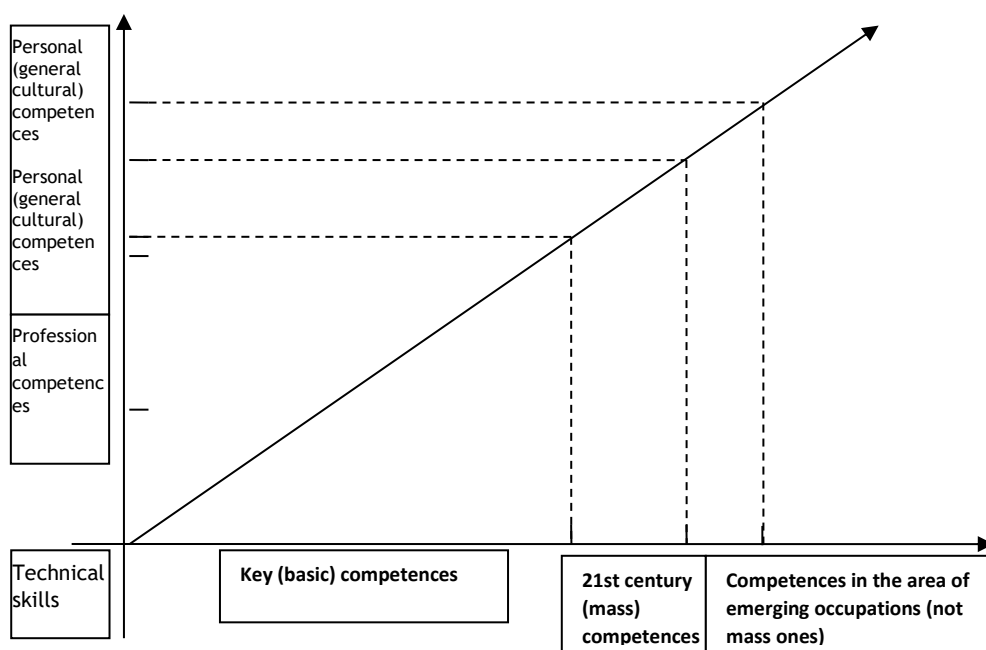


Figure 1. Competence model of a specialist (Blue-Collar Jobs)

This model represents main trends of changes in competences as long as the economy moves forward to the knowledge-driven economy. They are such processes as:

- Long-term increase in the share of personal (general cultural) or extra professional competences;
- Increase in demands for the level and range of professional and technical competences.

When competence units are filled with content in the abovementioned model, the following tendencies become evident:

- Internationalisation of the competence list;
- Increase in the share and significance of competences which provide for vocational and personal development;
- Increase in the meaning of creative and innovation elements of the competence profile;
- Increase in the meaning of inter-cultural and inter-industry openness and communication;
- Readiness for changes in the vocational profile and change of the profession due to fast obsolescence of professions and their elimination from the labour market.

The competence model of a professor of the secondary vocational educational establishment is considered to be relevant to the competence model of a specialist in terms of its structure, but it has different contents. The pedagogue's professional competences also include vocational pedagogical and pedagogical units. Personal (general cultural) competences are supplemented with the competences related to specific aspects of the pedagogical occupation.

The main issue is how vocational pedagogical and pedagogical competences have to change due to changes in the subject of their labour, namely improving competences in blue-collar jobs.

Hypothesis:

1. If significance of personal (general cultural) competences considerably increased for the present-day qualified workers and mid-ranking staff, a pedagogue must also have advanced and much richer cultural and pedagogical potential which enables him or her form and develop these personal competences of future workers in a free and creative manner.

2. If professional competences and skills tend to be updated quickly, a pedagogue must be aware of not only of new production technologies, but also of new competences.

3. If requirements for the level of mastering technical skills, workmanship go up, a pedagogue must master benchmarking in the sphere of professional achievements, know best professional practices and act as a role model of the level of technical skills.

4. In general, the requirement for the level of pedagogical infrastructure of the educational process (development of pedagogical technologies and culture) to be provided for by a professor of secondary vocational education is increasing.

Therefore, the monitoring system shall include:

1. Determination of the level and range of key (basic) vocational pedagogical competences.

2. Detection of the level and range of the pedagogue's mastering of new production spheres and technologies, and formedness of emerging competences.

3. Determination of the pedagogue's readiness for managing vocational development of students and his/her own one.

4. Determination of optimum forms of the pedagogue's professional development.

The following problems need to be overcome to fill up the competence model of a pedagogical worker:

1. An extremely wide range of competences in the area of blue-collar jobs, which requires determination of their typing and selection methodology as a basis of the competence model of a pedagogue.

2. Wording of various regulatory documents is not unified. If the federal state educational standard of secondary vocational education defines the educational result in terms of the competence approach, the occupational standards use other terms (general labour functions, labour functions, labour actions, knowledge, skills, and experience).

3. If key and basic competences are established by the occupational standard, emerging competences are usually specified in research foresights of different countries and are characterised by a great variety of approaches and terms.

4. The issue is that orientation at emerging competences makes the secondary vocational education sphere attractive for youth, thus aggravating the high demand for regular labour force in traditional economy sectors of modern Russia.

Comparative analysis of Russian and international research demonstrates that determination of key (basic) and emerging competences is becoming the most significant. Currently it is important not only to analyse and identify competences on the basis of the labour functions identified and established at the regulatory level, and to research the so-called functional dynamics of

professional development, but also to forecast emerging of new activities and professions demanded due to changes in technical waves and demand for new types of competences. This has been a basis for separating two main units in the competence model of a professor of secondary vocational education applied in the monitoring system: key (basic) competences and emerging competences.

In most publications, key competences are considered as the ones common for all professions and specialties. There are two terms for the concept considered in the English literature: key skills and key competences. Key professional competences are the worker's skills to solve tasks he/she faces in the professional career, which do not depend on the occupation or speciality (are invariable with regard thereto). They shall be mastered by each member of the community as they are universal and applicable in various situations (Marshuba, 2014).

The key competences concept, which was introduced into the scientific use at the beginning of 1990s by the International Labour Organization, is interpreted as a general human ability to mobilize the knowledge and skills in the course of professional activities and to use generalized ways of performance of actions (Marshuba, 2014). Key competences are inter-cultural and inter-industry knowledge and skills necessary for adaptation and high performance in various professional communities (Zeer, 2013).

Therefore, the monitoring is based on the competence approach. However, it is used in combination with the functional approach applied in occupational standards. Basic competences are defined as readiness of a professor of secondary vocational education for performance of labour functions specified in the occupational standard "Pedagogue of Vocational Training, Vocational Education and Supplementary Vocational Education" (Professional Standard..., 2015).

The emerging competences are listed on the basis of comparative analysis of a large number of Russian and foreign research foresights. In this case, the main difficulty was the significant differences in terms and grouping of competences. Foreign research mostly uses the term "skill", and the domestic ones use three of them: "knowledge", "abilities" and "skills". In addition, many characteristics which pertain to personal traits in the Russian research are included into skills and competences in the foreign research.

As for the fourth item, the following methodological principle may be established: emerging competences do not contradict key competences or even competences in traditional economic sectors, they become in the focus of prospective changes in all spheres. By mastering emerging competences a person changes his or her attitude to labour. His or her professional development and self-implementation opportunities in any sphere are considerably extended. That is why emerging competences may be understood as a "driver of changes" and are used as leading ones in the model of the competence profile of a professor of secondary vocational education. It is not a coincidence that their identification and forecasting is currently of priority in all countries which have entered or are entering the knowledge-driven economy.

Analysis of regulatory documents, Russian and international standards and research foresights has enabled developing the following competence model of a professor in the secondary vocational education system and taking it as a monitoring basis.

Competence model of a professor in the secondary vocational education system.

Basic competences. Readiness to perform labour functions in accordance with the occupational standard "Pedagogue of Vocational Training, Vocational Education and Supplementary Vocational Education":

— Establishment of pedagogical conditions for development of students within secondary vocational education programmes;

— Social and pedagogical support of students within secondary vocational education programmes in educational activities in vocational and personal development;

— Development of programme and methodological support of the training and production process;

— Arrangement of training and vocational activities of students to master vocational training programmes and (or) qualified worker, employee training programmes;

— Pedagogical control and evaluation of mastering of the qualification of a worker, employee in the course of training and production activities of students;

— Vocational guidance events with potential consumers of educational services and their parents (legal representatives).

Emerging competences which provide for advanced vocational development:

— Information and communication and media competences;

— Inter-cultural communicative competence;

— Mastering creativity techniques and readiness for innovation;

— Project management;

— Self-management of the professional development.

Within the main units, results of expert evaluation of the following competence clusters may also be analyzed:

— Mastering vocational pedagogical technologies (education, training, development);

— Competences in the area of social and pedagogical partnership;

— Professional ethics.

Discussions

At the international level efforts, coordination of efforts to establish common principles and approaches to reforming and advancing vocational education is performed by such organizations as the Organization for Economic Cooperation and Development (OECD), European Centre for the Development of Vocational Training (CEDEFOP), European Forum of Technical Vocational Education and Training, International Organization for Vocational Education and Training, European Training Foundation, International Bank for Reconstruction and Development etc. Efforts to develop the common vocational educational environment are also taken within the framework of the Copenhagen and Torino Processes (The Strategy for Developing..., 2013).

Comparative analysis of Russian and international research, the subject matter of which is to identify and substantiate key and emerging competences has been conducted. This became a basis for establishment the competence

model of a professor of secondary vocational education, used in the monitoring system.

First let's consider the research conducted by the Danish Technological Institute within the framework of the European Commission: Emerging skills and competences – A transatlantic study EU-US Study for the European Commission. As it is stated in the introduction, “the study covers approaches aimed on making education and training systems more responsive for emerging requests for matching the future requirements of more globalized labour markets”. The book uses the following terms and definitions by Cedefop: “Competence is an ability to apply learning outcomes adequately in a defined context (education, work, personal or professional development)” Key (basic) skills / competences mean “the sum of skills (basic and new basic skills) needed to live in contemporary knowledge society” (Emerging Skills and Competences..., 2011).

Eight key competences have been established within the European framework, and necessary knowledge, skills and relations associated with each of them are described.

Key competences include:

— communication in the mother tongue, the ability to express and interpret concepts, thoughts, feelings, facts and opinions in both oral and written form (listening, speaking, reading and writing) and to interact linguistically in an appropriate and creative way in a full range of societal and cultural contexts;

— communication in foreign languages, which involves, in addition to the main skill dimensions of communication in the mother tongue, mediation and intercultural understanding;

— mathematical competence and basic competences in science and technology. Mathematical competence is the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations, with the emphasis being placed on process, activity and knowledge;

— digital competence, which involves the confident and critical use of information society technology (IST) and thus basic skills in information and communication technology (ICT);

— learning to learn, is the ability to pursue and organize one's own learning, either individually or in groups, in accordance with one's own needs, and awareness of methods and opportunities;

— social and civic competences, which refers to personal, interpersonal and intercultural competence and all forms of behaviour that equips individuals to participate in an effective and constructive way in social and working life. It is linked to personal and social well-being;

— sense of initiative and entrepreneurship, which is the ability to turn ideas into action. It involves creativity, innovation and risk-taking;

— cultural awareness and expression, which involves appreciation of the importance of the creative expression of ideas, experiences and emotions in a range of media (music, performing arts, literature and the visual arts)(Emerging Skills and Competences..., 2011).

The Strategy for Innovative Development of the Russian Federation for the Period until 2020 contains a number of innovation competences which may also pertain to the key ones. They include:

— Capability and readiness for continuous education, improvement, retraining and self-training, professional mobility, and commitment to innovation;

— Capability for critical thinking;

— Capability and readiness for reasonable risk, creativity and entrepreneurship, ability to work on one's own, readiness for cooperation and highly-competitive environment;

— Foreign language skills implying capability for free daily, business and professional communication (The Strategy for Innovative Development..., 2011).

21st Century Skills (Competences)

Different countries actively work to develop lists of skills any person needs in 21st century. They are developed by several specialized consortiums (Table 1). The Russian Federal State Educational Standard also shares the ideology of 21st century skills which are represented in personal and meta-discipline results of programme mastering.

Table 1. Consortiums developing lists of 21st century skills

Name	Country	Abbreviation	Link
Partnership for 21st Century Learning	USA	P21	http://www.p21.org/
Assessment and Teaching of 21st Century Skills	International	ATCS	http://www.atc21s.org/
International Society for Technology in Education	USA	ISTE	http://www.iste.org/standards/istestandards/standards-for-students
European Union	International	EU	http://ec.europa.eu/education/policy/school/competences_en.htm
Organisation for Economic Co-operation and Development (OECD)	International	OECD	http://skills.oecd.org/
Ministry of Education of Singapore	Singapore	MOES	https://www.moe.gov.sg/education/education-system/21stcentury-competencies
Ministry of Education and Science of the Russian Federation	Russia	Federal State Educational Standard (FSES)	http://минобрнауки.рф/документы/543

Proposals of these consortiums (Table 2) partially coincide and supplement each other. Differences in terms are mainly preconditioned by linguistic traditions rather than scientific substantiation.

Table 2. Comparison of 21st century skills proposed by different consortiums (Zhilin, 2014)

P21	ATCS	ISTE	EU	OECD	MOES	FSES (Secondary General Education)
Learning and innovation skills 1. Critical thinking and problem solving 2. Creativity and innovation 3. Communication and collaboration	Ways of thinking and innovation 1. Creativity and innovation 2. Critical thinking 3. Determination to learn, meta-knowledge	Creativity and innovation Creative thinking, knowledge construction, product and process development using technology	Learning to learn		Critical and inventive thinking Relationship management	Cognitive reflection
		Critical thinking, problem solving and decision making				Decision making
	Ways of working 1. Communication 2. Collaboration (team work)	Communication and collaboration Use of digital media and environment to communicate and work collaboratively	Communications 1. Communication in mother tongue 2. Communication in foreign languages	Interaction in uneven groups 1. Good attitudes to others 2. Collaboration, team work 3. Conflict managing and solving skills	Collaboration, communication and information skills 1. Responsible decision making 2. Self-confidence	1. Collaboration skills 2. Efficient Communication and interaction skills 3. Cognitive activities skills 4. Language skills
Information, media and technology skills 1. Information literacy 2. Media literacy 3. Technology literacy	Tools for working 1. Information literacy 2. ICT literacy	Technology operations and concepts Understanding technology terms, systems and operations Research and information fluency Use digital tools to gather, evaluate and use information	Digital competence	Interactive use of tools: 1. Language, symbols and text; 2. Knowledge and information; 3. Technology		1. Independent innovative and cognitive activities 2. Skills to use ICT

Life and career skills	Living in the world	Digital citizenship	Social confidence and expression	Autonomous action	Civic literacy, global awareness and cross-cultural skills	
1. Flexibility and adaptability	1. Citizenship, local and global	Understanding humanitarian, cultural and technology issues	1. Social and civil competences	1. Acting inside a large picture	1. Self-regulation	1. Civil identity and position
2. Initiative and self-regulation	2. Life and career		2. Initiative and entrepreneurship feeling	2. Making and implementing life plans and personal projects	2. Social awareness	2. Scientific and poly-cultural mind-set
3. Social and cross-cultural skills	3. Personal and social responsibility			3. Protecting and ensuring rights, interests and needs		3. Self-development, readiness for education
4. Productivity and responsibility						4. Environmental thinking
5. Leadership						5. Determining objectives of activities

Emerging (Foresight) Competences. The research of D. Konanchuk & A. Volkov (2013) starts with the words, “Currently the world is on the brink of a new wave of innovation which may considerably change the established “educational landscape”.

According to the authors, the main trends setting principal prospects of vocational education development include the following:

- Massification of education;
- Internationalization of education;
- World economy turbulence and establishment of the new technological industry-related principles;
- Digital revolution.

According to these trends, professional skills which will be demanded in the future are predicted.

The Institute for the Future, Palo Alto, USA, which specializes in forecasting, published the report entitled “Future Work Skills 2020 Summary Map”, 2011 where the so called Future Work Skills 2020 Summary Map was presented (Future Work Skills..., 2011).

They explained their facilitation the development of the map with deeper understanding of what occupational skills will be most demanded in the technologically advanced and changing world in the current decade. This map demonstrates six global trends (drivers – disruptive shifts) which change the ordinary environment of labour resources and respective ten skills to be possessed by successful specialists by 2020 (Gurban, 2015). Therefore, six global drivers form the environment where occurrence of each skill is related to one or several mentioned trends (Figure 3).

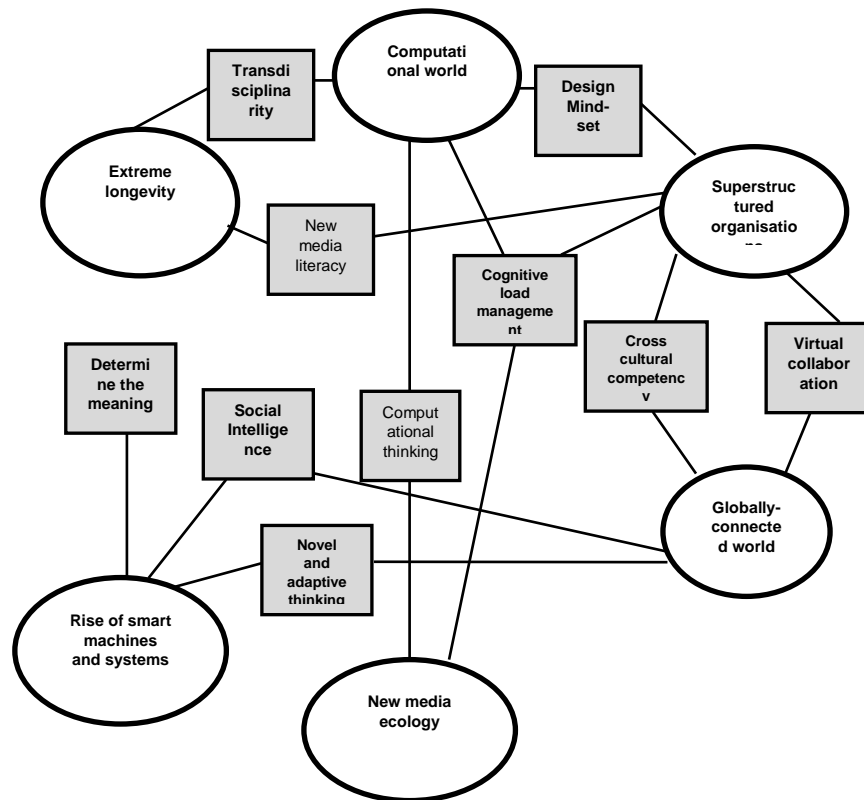


Figure 3. Future Work Skills 2020 Summary Map

The abovementioned approaches are based on futurology macro-models of strategic development and form the following logic: global trends are established and transform the environment and technologies, labour division forms. They turn into a basis of emerging competence system modelling. Then objectives of development of these emerging competences and search for development platforms are solved. However, another approach is necessary as well. According to H. Mintzberg, B. Ahlstrand & J. Lempel (2001), strategies must not only be planned, they must be formed as well. They shall not only be based on the expected future models, but they may be grown and developed out of sprouts of the future, which exist in the present and even in the past. Strategies of this kind are based on analysis and detection of best practices, their development and distribution. Logic of this approach is as follows: best practices are analyzed, then new operational references and standards are developed and later turn into the basis of training and other forms of support and distribution thereof.

H. Mintzberg, B. Ahlstrand & J. Lempel (2001) defines those two types of strategies as prescriptive and descriptive ones. Prescriptive strategies are based on the expected future models whereas descriptive strategies are based on description of sprouts of the new in the past and present.

In vocational education, activity within WorldSkills movement is a vivid example of the descriptive approach. It is an international non-commercial movement, the purpose of which is to increase prestige of blue-collar jobs and to develop vocational education by harmonizing best practices and professional standards all over the world by arranging and holding vocational workmanship competitions in each individual country and all over the world. The mission of

WorldSkills is “to develop professional competences, to raise the profile and recognition of skilled workers, and show how important skills are in achieving economic growth and personal success”.

WorldSkills, founded in 1946, unites 75 countries and is an international platform for professional growth and improvement of work skills. Its focused on the system of regional, national and international competitions. The global platform of competence and professionalism developed is actually formed. Russia joined WorldSkills in 2012.

WorldSkills standards specifications (WSSS) describe knowledge, abilities and skills which best international practices in the sphere of vocational education are based on. WorldSkills standards specifications represent international requirements for professional qualifications compared with the best practices and industry-related standards.

Now the WorldSkills practice is perceived in Russia as a basis for shaping the new strategy for developing secondary vocational education and forming the competence model of a specialist in compliance with the new economic needs, rather than “the sport of records”. Russia’s participation on WorldSkills competitions allows joining the system of international requirements and experience in the area of competence development in a natural manner (National Competition, 2016).

“Some people believe that a person must obtain higher education by all means. Today WorldSkills helps getting blue-collar jobs to the level where the whole society, including children, parents and employers, sees value of blue-collar jobs. They understand that good qualifications must be well-paid. We as a country must also face this challenge. WorldSkills is an efficient tool to develop vocational education in Russian and gain access to leading technologies in the sphere of production and service” (Golodets, 2016).

Many of competence models based on WorldSkills standards specifications, which have already been mastered and are implemented in other countries, still have not been mastered by our country to the full scope and may pertain to the emerging ones. As an example, let’s consider WorldSkills standards specifications of the USA (Skills USA Framework, 2016).They include the following skills (Table 3).

Table 3. Key skills according to WorldSkills USA Standard

No.	Personal Skills
1.	Integrity
2.	Work Ethic
3.	Professionalism
4.	Responsibility
5.	Adaptability/Flexibility
6.	Self-Motivation
Workplace Skills	
1.	Communication
2.	Decision Making
3.	Teamwork
4.	Multicultural Sensitivity and Awareness
5.	Planning, Organizing and Management
6.	Leadership
Technical Skills Grounded in Academics	
1.	Computer and Technology Literacy
2.	Job-Specific Skills
3.	Safety and Health

4.	Service Orientation
5.	Professional Development

Research Foresights in Russia

The Emerging Occupations Collection (2014) drafted by the Agency for Strategic Initiatives and Skolkovo Moscow School of Management and the research conducted within the framework of the scientific school of academician Romantsev, 2007; Fedorov & Khamatnurov, 2010 was selected for analysis.

In Russia, proper attention is paid to the world changes, which is confirmed by Global Education Future international project. The large-scale research “Competence Foresight – 2030” was held within the project with support of the Agency for Strategic Initiatives and Skolkovo Moscow School of Management. More than 2,500 Russian and international experts participated in this research; their goal was to detect emerging occupations in 19 branches of the economy sectors. Experts discussed technology changes, social and economic processes which affected structure of work tasks, and developed industry-related “maps of the future” which were used to detect demand for emerging competences and develop an image of emerging occupations. The results of the research were consolidated in the Emerging Occupations Collection (2014).

Emerging professions to appear in Russia in the nearest decade by 2020 were structured by the authors by configurations of competence packages which included the following: occupational competences (intra and inter-industry packages) and extra occupational competences.

The list of “extra skills and abilities” proposed by the authors, is of interest. Those skills and abilities are universal and important for specialists in various industries; mastering of them must enable employees to increase efficiency of professional activities in their industry and to switch professions both inside and beyond the scope of industries, and remain demanded due to their highly-developed level:

1. Systematic thinking in the form of an ability to define and develop complex interactions which create a conceptually new trait, and ability to work with them, including simultaneousness of thinking and systems engineering.

2. Inter-industry communication (understanding of technologies, processes and market conditions in various related and non-related industries).

3. Project management (ability to construct, plan and arrange project and process performance).

4. IT solution programming, complicated automated complex management, and work with artificial intelligence.

5. Customer oriented approach (ability to work with consumers’ requests).

6. Multi-language and cultural skills (fluent English and knowledge of the second foreign language, understanding of the national and cultural contents of partnering countries, specific aspects of operation in industries of other countries).

7. Communication with people (ability to work with teams, groups and individual people).

8. Work under high uncertainty circumstances and quick changes of specifications (ability to make decisions quickly, respond to changes in working conditions, ability to allocate resources and manage your time).

9. Creativity skills (creative abilities, availability of developed aesthetic taste).

10. Lean production (Emerging Occupations Collection, 2014).

Therefore, extra occupational skills are actually found to be of priority for future professions, so relevant competences of pedagogical staff shall be developed.

The research of the scientific school of academician G.M. Romantsev (Romantsev, 2007, Fedorov & Khamatnurov, 2010) are focused on another side of contemporary vocational education. According to the experts, training of regular labour force for high-technology enterprises in Russia faces the problem that professors of training centres and masters of vocational training themselves lack knowledge, abilities and skills of operating high-tech equipment. Therefore, they are unable to teach the worker main operating principles or to develop adaptive training and methodological materials. As a result, education remains falling behind, catching up, whereas real life requires it to be innovative and ahead of the times.

In order to enable professors and masters of vocational education to perform their functions efficiently, their competences must be adorned (improved) by forming additional managerial skills necessary to interact with equipment supplies, and manage the project team when developing innovative learning kits. These skills (competences) are listed in the federal state educational standard of higher education for speciality 38.03.02 Management:

— Oral and written communication skills in the Russian and foreign languages to solve inter-personal and inter-cultural interaction tasks;

— Skills of using basic motivation, leadership and authority theories to solve strategic and operating management tasks, and to arrange team work on the basis of knowledge of group dynamic processes and team formation principles, abilities to audit human resources and diagnose the organizational culture;

— Ability to participate in project management, programme for implementing technological and product innovations and organizational changes;

— Ability to establish and maintain contacts with business partners by means of information collection systems in order to expand external connections and share experience during implementation of the projects, aimed at organization's development (Dremina, Kopnov & Lyzhin, 2016).

It is evident that the approach based on social and occupational competences and the approach based on technological and professional competences bring us to separate common emerging skills and competences, demanded by the knowledge-driven economy.

Conclusion

The theoretical and methodological significance of the results presented in the article is exploring methodological approaches to substantiation of the model of and procedures for monitoring of the human resourcing of the secondary vocational education system of the Russian Federation with pedagogical staff

On the basis of analysis of regulatory documents of the Russian Federation, the Occupational Standard "Pedagogue of Vocational Training, Vocational Education and Supplementary Vocational Education" (2015), Russian and

international research into establishment of the list of competences of a professor of secondary vocational education, the following conclusions were made:

- Monitoring must be based on the competence model of a professor;
- Competence model of a professor of the secondary vocational education must be relevant to the competence model of a specialist (blue-collar jobs) in terms of its structure, but it must have different contents;
- As basic (key) and emerging competences play a major role in the competence model of a specialist (blue-collar jobs), it is expedient to establish the same structural units in the competence model of a professor. It will not only enable granting the monitoring procedures the function of reflection of the current system condition, it will also establishing vectors of advanced development;
- Integration of social occupational and technological occupational approaches, prescriptive and descriptive approaches to strategic analysis, competence, functional and general pedagogical approaches must be the methodological basis of development of the competence model of a professor of secondary vocational education.

Practical significance of the results is the development of the monitoring model and tools. The developed competence model of a professor of secondary vocational education, the questionnaire, the organizational and methodological monitoring model and results of approbation thereof are of practical significance.

Monitoring on the basis of the developed model will enable developing a substantiated approach to setting applicable and prospective objectives of human resource potential development of the secondary vocational education system, forming optimum forms of psychological pedagogical support of pedagogical staff in the secondary vocational education system.

Recommendations

The main theoretical and practical results of the research may be applied to develop the conceptual framework to improve the quality of the human resource potential of the secondary vocational education system, to develop scientific and methodological support of arrangement and implementation of the analysis and monitoring procedures in the secondary vocational education system, to establish the information and analytical database, and may be implemented into practical operation of secondary vocational educational establishments of the Russian Federation and government authorities managing secondary vocational education as an element of the system for monitoring of human resourcing with pedagogical staff.

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References

- Ashmarina, S. I., Streltsov, A. V., Dorozhkin, E. M., Vochozka, M. & Izmailov, A. M. (2016). Organizational and Economic Directions of Competitive Recovery of Russian Pharmaceutical Enterprises. *IEJME — Mathematics education*, 11(7), 2581-2591.
- Davydova, N.N., Dorozhkin, E.M., Fedorov, V.A. & Konovalova, M.E. (2016). Research and Educational Network: Development Management. *IEJME - Mathematics Education*, 11(7), 2651-2665.
- Dorozhkin, E.M., Leontyeva, T.V., Scherbina, Y.Y., Shchetynina, A.V. & Pecherskaya, E.P. (2016). Teacher's Labour as a Tool of Forming Human Capital of Higher School Graduates. *IEJME-Mathematics Education*, 11(7), 2773-2787.
- Dremina, M. A., Kopnov, V. A. & Lyzhin, A. I. (2016). Staff Training for High-Technology Production. *The Education and science journal*, 1, 50-75.
- Dudyrev, F. F. (2016). *On Development Trends of Secondary Vocational Education and Education Training*. Direct access: http://worldskills.ru/wp-content/uploads/2016/02/26.05.2016_YEKspertnaya-diskussiya_O-trendakh-razvitiya-SPO_Dudyrev.pdf.
- Emerging Occupations Collection. (2014). *Agency for Strategic Initiatives and Skolkovo Moscow School of Management*. Direct access: http://www.skolkovo.ru/public/media/documents/research/sedec/SKOLKOVO_SEDeC_Atlas.pdf.
- Emerging Skills and Competences – A transatlantic study EU-US Study for the European Commission (2011). DG EAC, 141 p.
- Fedorov, V. A. & Khamatnurov, F. T. (2010). Scientific and Educational School “Scientific Fundamentals of Development and Design of Vocational and Vocational Pedagogical Education in Russia” of academician of the Russian Academy of Education, G. M. Romantsev. *The Education and science journal*, 10(78), 126-140.
- Future Work Skills 2020 Summary Map (2011). *Institute for the Future*. Direct access: http://www.iftf.org/uploads/media/IFTF_FutureWorkSkillsSummary_01.gif.
- Golodets Found Higher Education Unnecessary for Two Third of Workers in the Russian Federation (15 July 2016). Interfax. Direct access: from <http://www.interfax.ru/business/518708>.
- Graduate employability in Asia (2012). *Bangkok, UNESCO, 2012*. Direct access: <http://unesdoc.unesco.org/images/0021/002157/215706E.pdf>.
- Gurban, I. A. (2015). Global Educational Trends: Challenges Russia Faces. *Bulletin of the Ural Federal University. Economy and Management Series*, 14, 5, 812–830.
- Konanchuk, D. & Volkov, A. (2013). *Greenfield Epoch in Education*. Skolkovo: Business School Education Development Centre, 352 p.
- Kutepov, S. N. (2015). *Vocational Education and Regular Labour Force Training in Europe*: PhD Thesis. Tula: Tula State L. N. Tolstoy Pedagogical University, 146 p.
- Marshuba, O. A. (2014). Key Competences as Elements of Occupational Competence. *Koncept, Special Edition*, 08. Direct access: <http://e-koncept.ru/2014/14599.htm>.

- Mintzberg, H., Ahlstrand, B. & Lempel, J. (2001). *Strategy Schools*. Saint-Petersburg: Piter, 336 p.
- National Competition “Young Professionals” (2016). Direct access: <http://worldskills.ru/home/missiya/>.
- Professional Standard “Pedagogue of Vocational Training, Vocational Education and Supplementary Vocational Education” (2015). Direct access: <http://xn--c1arjr.xn--p1ai/wp-content/uploads/2015/02/Pedagog-DPO.pdf>.
- Romantsev, G. M. (2007). *Theory and Practice of Vocational Pedagogical Education*. Ekaterinburg: Publishing House of the Russian State Vocational Pedagogical University, 304 p.
- Shchedrovitsky, P. G. (2016). *III Industrial Revolution and Changes in Competence Requirements*. Direct access: http://worldskills.ru/wp-content/uploads/2016/02/25.05.2016_Lekciya-dlya-BC_CHast-1_SHHedrovickiy.pdf.
- Skills USA Framework (2016). Direct access: <http://www.skillsusa.org/about/skillsusa-framework/>.
- Strategy for Innovative Development of the Russian Federation for the Period until 2020 (2011). *Decree of the Government of the Russian Federation dated December 08, 2011, No. 2227-p*. Direct access: <https://rg.ru/2012/01/03/innov-razvitie-site-dok.html>.
- The Strategy for Developing the Regular Labour Force Training System and Forming Applied Qualifications for the Period until 2020 (2013) Direct access: http://xn80abucjibhv9a.xnp1ai/%D0%BF%D1%80%D0%BE%D0%B5%D0%BA%D1%82%D1%8B/413/%D1%84%D0%B0%D0%B9%D0%BB/2605/BookEducation_02.pdf.
- Zeer, E. F. & Streltsov, A. V. (2016). Technological Platform for Realization of Students' Individual Educational Trajectories in a Vocational School. *IEJME — Mathematics education*, 11(7), 2639-2650.
- Zeer, E. F. (2013). *Vocational Education Psychology*. Moscow: Akademiya Publishing Centre, 416p.
- Zhilin, D. M. (2014). *XXI Century Skills and XXI Century Science – Controversy or Conformance?* Direct access: <https://docviewer.yandex.ru/>.