

UDC 377.1**Problems of designing the content of educational disciplines in the context of introduction of professional standards: experience of russian colleges****Alsu R. Kamaleeva**

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Abstract

The purpose of the article is to study the changes in the process of designing the natural science and vocational training of students in vocational education in the context of integration of new educational and professional standards. The authors of the article checked a hypothesis of interrelation of educational and professional standards in the system of vocational education and training. The dynamics of teacher's opinion is investigated with the help of the adapted didactic means – the questionnaire allowing to describe both quantitative and qualitative characteristics of the happening integration processes. The works by scientists concerning development of modern Russian professional education in the context of the Copenhagen Process and the Europe 2020 Strategy in the conditions of integration of educational and professional standards have been studied and analyzed. The research showed that even in the region with a rather high level of economic development, the interested part of teachers came to understanding, that natural science and vocational training of a student of the VET system has to meet the needs of the modern labor market according to the requirements of the developed professional standard. Practical significance of the article consists in the revealed positive dynamics of teachers' opinion on the need of changes in the process of training courses of a natural science and professional cycle

according to integrative processes. The results of the conducted research can be useful for experts in the field of education, and are interesting for public.

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Keywords

Integration of educational and professional standards, vocational education and training (VET), natural science knowledge, teachers' opinion, pedagogy.

Introduction

The changes in the modern society, the high rates of its development, and introduction of new technologies put professional education before the need for a comprehensive analysis of the theory and practice, the state assessment of vocational training of students, the development of the basic principles of educational policy in Russia, defined in the Law of the Russian Federation About Education.

Since 2018, introduction of the 4th Generation Federal State Educational Standard (FSSES) of the VET has been planned, due to the accession of Russia to the system of vocational education established in Europe (2010), as a universally recognized standard of the training quality and mobility of skilled workers engaged in production with an established general system for assessing the quality of education [Lempinen, 2011]. "The Copenhagen process is the most important mechanism for the European integration of vocational education and training systems within the framework of the Lisbon Strategy for transforming the EU into the most competitive global economy based on knowledge" [Oleinikova, 2007, 2].

In 2011 P. Lempinen emphasized, "...one of the most important results of the Copenhagen process was general understanding that European countries should develop vocational education and training in one direction, but by different methods of submission." State bodies, educational institutions, social partners and other stakeholders had reached this understanding during national and European discussions. As a result the countries adopted common priorities: they developed a number of the all-European principles and tools intended to make qualifications more clearly and for promotion of mobility and bigger flexibility of systems of professional education and training"¹.

The "Copenhagen Process" [Bukhmin, 2014] strategy, like the Copenhagen Declaration, considers the issues of personnel's mobility, improvement of the quality of education and application of qualifying national frameworks. Introduction of the latest correspondences with the need to fully take into account the requirements of national qualification frameworks. "It is necessary to recognize that the introduced framework stimulates the increase of the level of professional training" [Sinyagovskaya, 2013], however their development and implementation are accompanied by a number of problems in different countries for lack of a clear adaptive mechanism.

At the same time, native vocational education and training does not fully take into account the

1 Text of the Copenhagen Declaration.

interests of dynamically developing modern production. Employers as consumers of the results of the quality of education in vocational education institutions make demands on the level of preparedness of graduates, the speed they use to master certain competences, and also the ability to master new ones [Harring et al., 2010]. The new view on quality of education focuses professional educational institutions on reconsideration of goals and results of education, the choice of innovative forms, methods, means and technologies of the organization of educational process [Kazakova, Polyakova, 2017; Levina et al., 2017]. As a result formation at students not only knowledge and skills, but also the corresponding competences and professional qualifications as readiness to apply this knowledge and skills in future professional activity becomes a priority of secondary professional education.

Realization of the task is complicated by the need to resolve the contradiction between the reduction of study time for the study of natural and professional disciplines and the need for each graduate to master the skills of working with modern high-tech equipment. This is especially true in conditions when the professional qualification of workers, employees and middle-level specialists should be determined by the complex of both general labor functions and ones contained in professional standards. At the same time, the modern subject system of education leads to the fact that students acquire discrete knowledge, abilities and skills. It is obvious that increasing the effectiveness of modern vocational education should be aimed at equipping students with the abilities and skills of a higher level of generalization, that is to the universal introduction of a mechanism for transferring knowledge, skills and habits acquired in the study of natural science disciplines, in practice of studying professionally oriented subjects and further practical activities.

Thus, within the competence-oriented direction in the native vocational education, there is a reorientation to the development of such professional qualities of future graduates as creativity, the ability to innovate and inventiveness, independence, responsibility, and others. The effectiveness of the development of such qualities will be determined by the content potential of not only interdisciplinary courses and professional modules (based on educational standards, as well as from the requirements of enterprises – employers), but also the substantive structure of general professional disciplines, natural-mathematical disciplines; methods, forms of training; objective evaluation of educational achievements, corresponding to the goals of modern vocational education.

The theoretical significance of the article is to develop theoretical and practical requirements for the systematization of design and implementation of modern scientific and vocational training in the context of the integration of new educational and professional standards.

Practical significance lies in the development and implementation scientific and methodological recommendations for the design and realization of natural science and vocational training, reflecting the requirements of the VET FSES-4 and professional standards in the educational practice of organizations of the VET.

The problem of the study considered in the article is the changes occurring in the native system of vocational education, which require the identification of the specifics of the design of work programs, the generalization of theoretical and practical requirements for the design and implementation of the content of natural science and professional disciplines in institutions of vocational education and training in accordance with the professional standards developed by employers.

This problem became the basis for setting the following goal: to assess the changes in the process of designing the natural-science and vocational training of students of vocational education and training in the context of the integration of new educational and professional standards

The review of previous research

In the process of the study, the scientists of the Institute of Pedagogy, Psychology and Social Problems (the FSBSI IPPSP) the experience of designing, structuring and implementing training courses of various profiles within the educational programs of institutions of secondary vocational education was studied: at the level of general educational disciplines by V.S. Bukhmin [Bukhmin, 2014], A.R. Kamaleeva [Kamaleeva, 2015], O.B. Ruskova [Ruszkova, 2016; Ruszkova, Gruzskova, 2015]; at the level of general professional disciplines by V.V. Semakova, T.N. Lukoyanova [Lukoyanova, Semakova, 2014], R.U. Rafikov [Rafikov, 2013], E.N. Prokofieva [Prokofieva, 2013], E.R. Sokolova [Sokolova, 2014], N.A. Chitalin [Chitalin, 2016]; at the level of interdisciplinary courses by S.Yu. Gruzskova [Gruzskova, 2014], as well as the foreign experience on the example of the technical colleges of the USA by M.A. Choshanov [Choshanov, 2016, 2013].

M.A. Choshanov notes that in colleges of the USA a design of training programs and courses is carried out when using three main approaches: the approach based on contents (ContentApproach); the approach based on a product (ProductApproach); the approach based on process (ProcessApproach). In turn, each of approaches by the author is characterized as follows:

- The first suggests that the algorithm of designing a curriculum or course is reduced to the compilation of a knowledge list, what students need to know;

- In the second one the emphasis is on what the instructors can do, the component of skills and performance;

- The third approach implies that the process of formation of understanding and knowledge of students depends on the process of interaction of individuals in the process of cognition, as well as interaction of them with their environment.

According to the "Europe 2020" strategy, three mutually complementary priorities are singled out in the development of vocational education: smart growth (development of knowledge, innovation, education and digital society), sustained growth, increasing growth (increasing of employment level and fighting with poverty) [Gonda, 2014]. Moreover, the national governments of the EU member states should report annually on their advancement in achieving the goals of the "Europe 2020" strategy [Bordyashov, www].

One of the strategic directions of the research activities of our Institute is international cooperation in the field of education and science, participation in the implementation of educational projects and programs in the context of international educational integration [Tregubova, 2011]. As S. McKeeney a professor at the University of Glasgow (the UK) [McKinney, 2010] and a member of the TEMPUS-IV Program of the International ALLMEET Project Consortium Joint with the IPPSP noticed that its essential characteristics are mutual influence, complementarity, mutual enrichment, the vocational education system development of its national borders and formation of a single zone of international education. The successful international activity of the Institute, the demand, including at the international level, of its scientific developments and publications, allowed it to participate in the projects competition of the ERAZMUS Program, which is an integral part of the HORIZON 2020 Program, the largest program (2014-2020) with a budget of more than 77 billion euros financed by the EU countries on carrying out researches and introduction of innovations, including in education. In 2017, as a part of the Russian-Chinese-European Consortium, the Institute became a participant of the International Grant for the Improving the Learning Technologies in Russia and China on the Basis of the Best European Practices (ENTEP) Network Project of the Erasmus Program + [Tregubova, 2013].

The ENTEP International Consortium includes well-known European and Chinese universities, in particular the Dresden Technical University (Germany), Sanya University (China), Liverpool University by D. Morisa (Great Britain), Bologna University (Italy). The last is well known to the international community for its achievements in the integration sphere of education levels, teaching technologies, and the internationalization of the education content, which is reflected in detail in the publications of professors at the Faculty of General Pedagogy at the University of Bologna [Cuconato, 2015; Zannoni, www; Zannoni, 2015].

Undoubtedly, the experience of professional educational organizations in Italy, Great Britain, Portugal, and Russia will become the basis for the project, taking into account the national and regional needs of its partners in the conditions of more globalized labor market and educational services.

Integration processes in vocational education in Russia are primarily related to the promotion of the Smart Growth priority put forward by the Europe 2020 strategy of development-related knowledge, innovation, education and the digital society. These processes are expressed in the unity of tasks between employers and educational organizations for training skilled workers and employees that is in the integration of new educational and professional standards.

The concept of professional standards is based on the task of solving labor market problems, satisfying employers' request for a shortage of specialists (qualified personnel: workers, employees, craftsmen, etc.) in certain professions within the framework of public-private partnership. In accordance with this concept, the new FSES-4, in contrast to the FSES-3, assumes the design of modern natural science and vocational training in the VET institutions not separately for each profession and specialty of the VET, but in the areas of training. Association of the profession and specialty in a certain direction of training is based on the commonality of general professional competence. As a result, a number of programs aimed at all the professions and specialties of one of the training areas appear, rather than one educational program, as it was in the FSES-3. This allows changing the number of professional educational programs in accordance with the requests of employers.

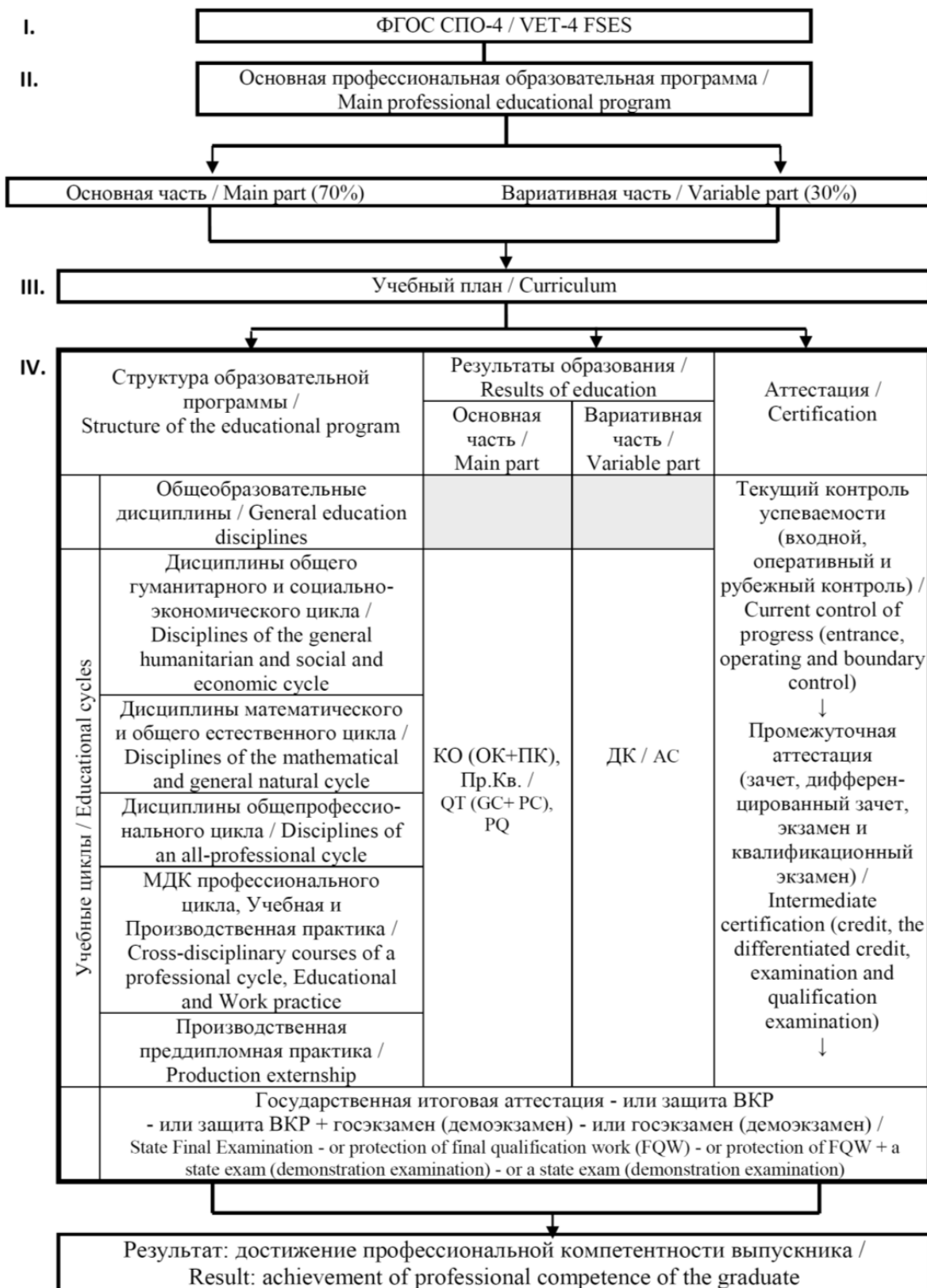
Schematically, the design of the content of vocational education according to the VET-4 FSES is carried out at four interconnected levels (see Figure 1).

Analysis of the VET FSES-4 showed that the educational program contains cycles: the general humanitarian and socio-economic one; mathematical and general natural-science one; general professional one; professional one; state final attestation (Fig. 1).

The program defines the types of professional activity with the general and professional competences included in them, as well as the results of mastering the educational program. The content of the programs of professional modules and test measurement materials are developed on the basis of specifications compiled for each professional competence. Evaluation materials are developed in accordance with the requirements for learning outcomes specified in the specifications.

The peculiarity of the educational program is that an educational organization decides if a demonstration exam (state exam or demo exam) is included in the structure of the state final certification, which is carried out in the form of protection of the final qualifying work.

The peculiarity of the new VET FSES distinguishes their educational standards of the second generation, which clearly separated the notions of "results of education" (or qualification by training (QT), or academic qualification) and "professional qualification" (PQ), representing a set of generalized labor skills and functions.



QT - qualification by training; GC - general competences; PC - professional competences; PQ - professional qualification; AC - additional competences.

Figure 1 - Levels of design of the main professional educational program

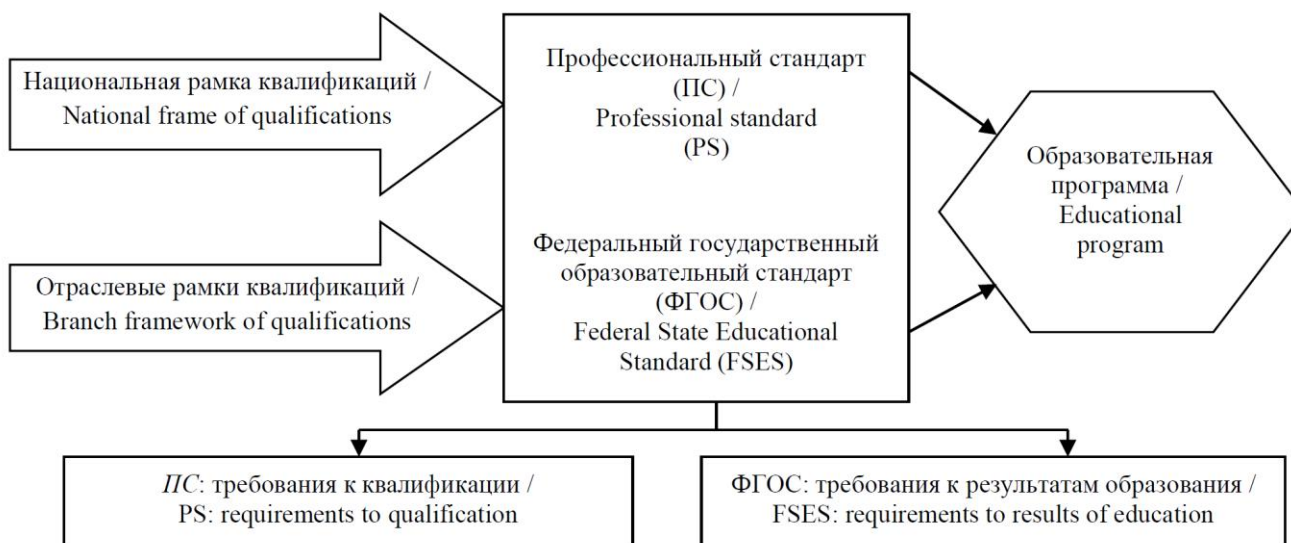


Figure 2 - Distribution of spheres of influence of professional education and labor market

All this determines the content and duration of vocational training in each profession of a worker who serves in accordance with a specific vocational training program developed and approved by the organization that conducts educational activity on the basis of established qualification requirements (professional standards).

When working on the theme "Theoretical and methodological foundations of structuring and development of vocational education at different levels", implemented within the framework of the project "Polycultural Foundations and the Didactic Maintenance of the Content of Vocational Education" (Project No. 1732), in the works by the staff (L.Yu. Mukhametzyanova, A.R. Kamaleeva, S.Yu. Gruzskova, O.B. Russkova, V.Sh. Maslennikova, M.A. Choshanov, N.V. Shigapova, O.V. Sofinskaya, etc.) of the Institute of Pedagogy, Psychology and Social Problems the constructs of the educational process in institutions of vocational education and training [Mukhametzyanova, 2016; Maslennikova, 2017], the analysis of alternative assessment methods of training activities and students' progress in the system of professional education taking into account specifics of a profile of preparation according to requirements of professional standards were considered and presented in publications of the technological support [Russkova, 2017; Choshanov, 2013; Sofinskaya, 2014].

Materials and methods

To study and evaluate the process of designing curricula of natural science and professional disciplines in the context of integrating professional and educational standards, a didactic tool was developed – a questionnaire comprising 6 blocks and 32 questions:

- data on the teaching staff of the respondents engaged in the design and improvement of educational programs (this unit consists of 7 general questions about the identity of the character who took part in the questioning of the respondent);
- design of disciplines curriculums (contains 9 questions that take into account the level and degree of participation of each respondent in the design of the content of training courses, the forms, methods and means of teaching used in this case);
- implementation of interdisciplinary links (consists of 3 questions reflecting the level of establishing interdisciplinary links in the design of the content of training courses with other

- disciplines, as well as with the content of training and work practices);
- account of graduates' future careers (the unit includes 3 questions focused on the assessment of students' preparedness by the teacher on the discipline taught, as well as on account of the wishes on the part of employers to improve the quality of teaching discipline);
 - educational and methodological support for the design of curricula (contains 6 questions aimed at identifying the forms and means of instruction used by teachers, both in paper and digital versions);
 - difficulties experienced by respondents in the design of educational programs that allow assessing the situation not only of the design, but also the state of teaching natural science and professional cycle disciplines in different regions of the Russian Federation (4 questions).

Results of the research

The total number of the respondents who took part in the survey was 545 teachers of vocational education and training institutions of 7 federal districts, which included 4 republics, 12 regions and 28 cities of Russia (Figure 3).

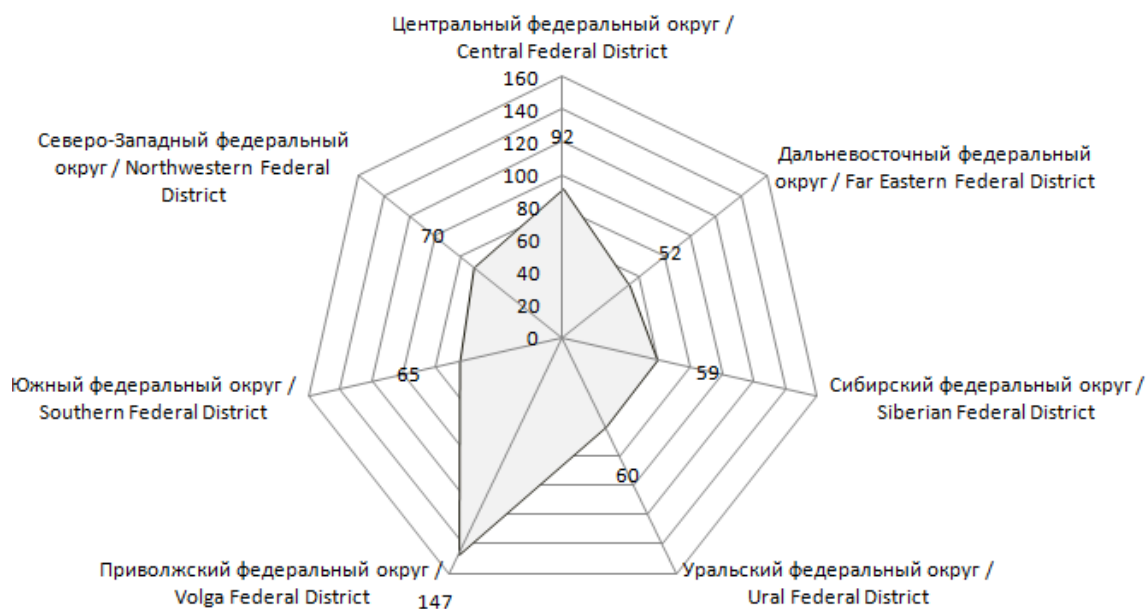


Figure 3 - The number of the respondents covered by questioning

Data from the questionnaires (43 respondents) for the Republic of Tatarstan (with a fairly high level of economic development) indicate a positive dynamic of changes in the design of training courses in the context of the integration of professional and educational standards (the fourth generation).

It should be noted that the previous questionnaire, conducted in 2013 (for Tatarstan and the cities of Russia) and aimed at identifying the difficulties faced by teachers in practice when updating the education system in the framework of the implementation of the requirements of the third generation standards, showed that the design of the contents of the academic disciplines and interdisciplinary courses is complicated by the contradiction between the educational standard (VET FSES) and the interests of the customer (employer).

Despite the revealed discrepancies, the results of the last questionnaire showed that about $\frac{1}{2}$

respondents (the RT data) assess the preparedness of the students of the VET on their discipline at a sufficient level, both from the point of view of the necessary knowledge for the modern person and in terms of their preparedness for the future professional activities (Figure 4).

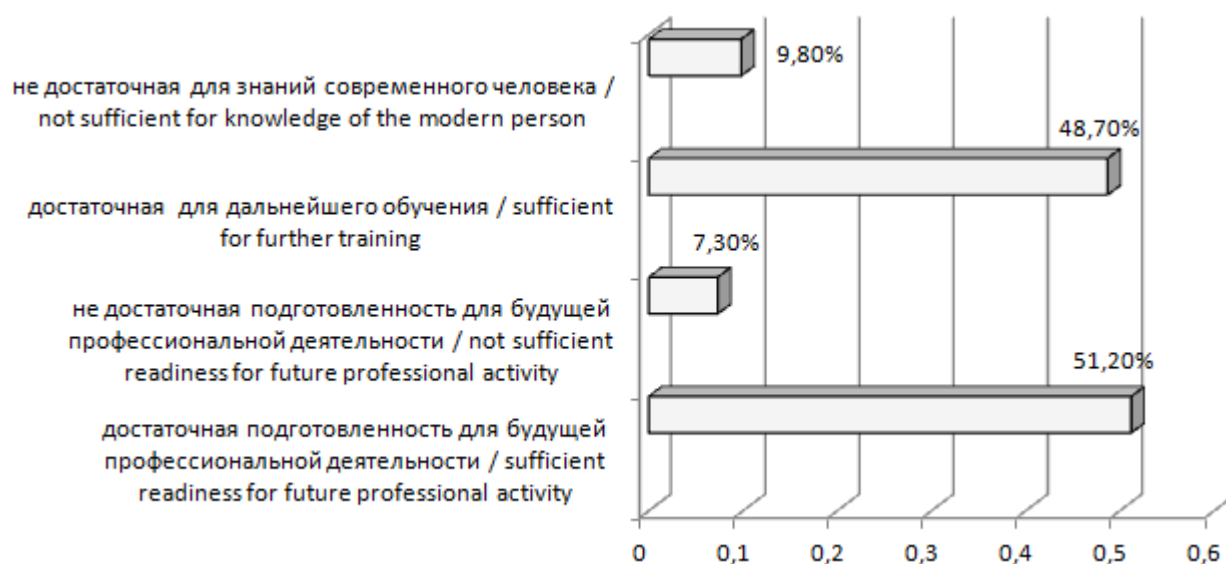


Figure 4 - The teachers-practitioners' evaluation of the students' preparedness degree for the discipline taught by them (data on the Republic of Tatarstan)

However, teachers continue to face difficulties in creating presumptive options for their activities, both at the design stage (Figure 2) and when choosing approaches in the presentation of the training material (Figure 5). When designing, difficulties about the majority of the respondents (about 32%) are related to the selection and correction of educational material. There are also difficulties not only at the stage of designing work programs (24.4%), but calendar and thematic plans (about 17%).

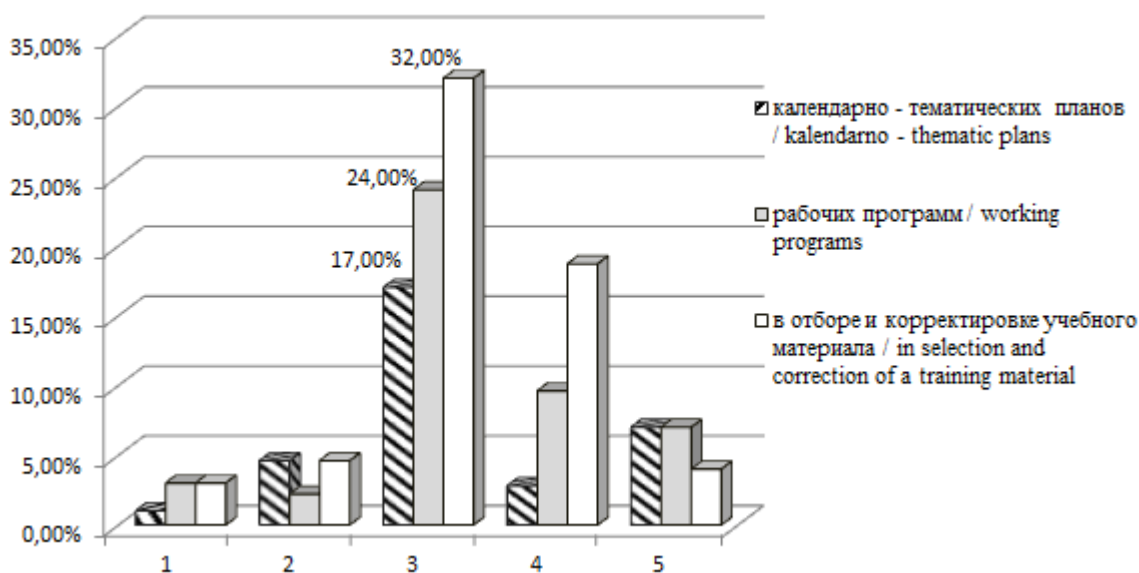


Figure 5 - Difficulties which are experienced by teachers in a designing process, on a five-point scale (data on the Republic of Tatarstan)

As for the selection and application of technologies for the presentation of educational material, about 1/3 of respondents note difficulties in the use of case technologies (29.3%) and gaming technologies (24.4%), as well as in the methodology of teaching their disciplines (24,4%).

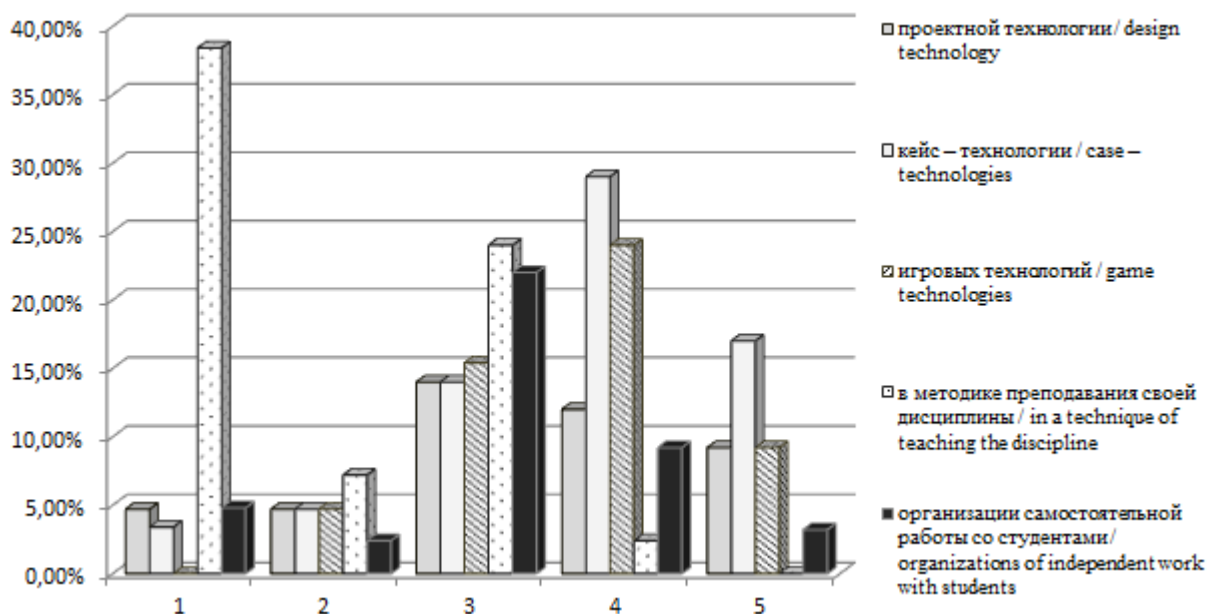


Figure 6 - Difficulties which are experienced by teachers at the choice of new approaches in statement of a training material on the taught discipline, on a five-point scale (data on the Republic of Tatarstan)

The mentioned difficulties can be partially caused by the deficit of necessary educational and methodological literature in educational institutions (Figure 7), namely: methodical one (78%), rational use of information and computer technologies (63,4%) and evaluation of learning outcomes (48,7%).

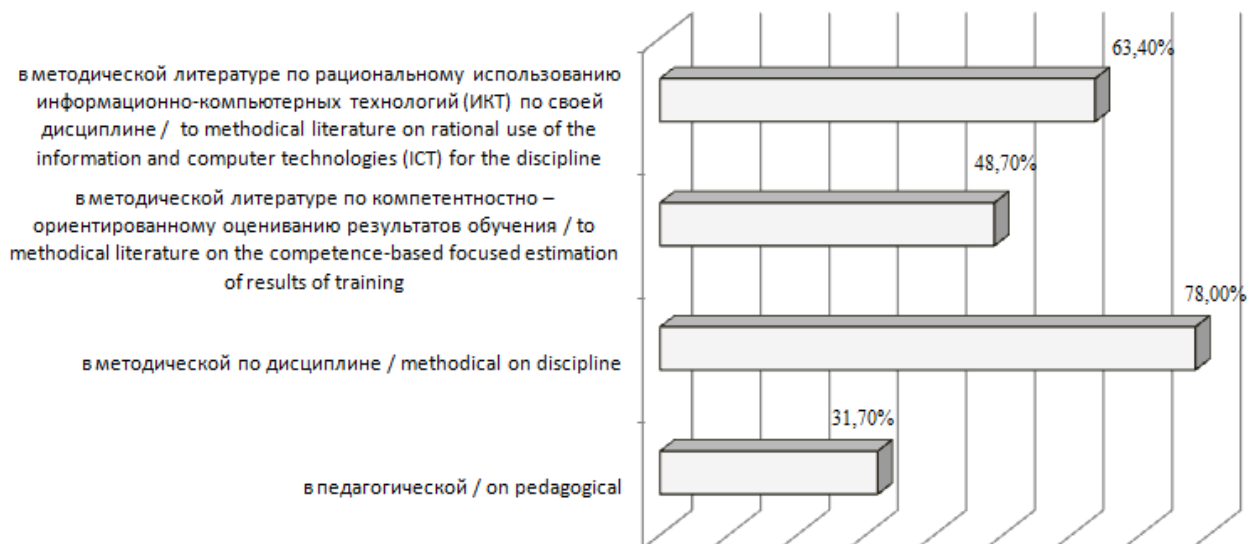


Figure 7 - Teaching and methodical literature, the deficit of which is experienced by teachers in the design of training programs (the Republic of Tatarstan data)

To cope with the difficulties in the development (improvement) of curricula for teaching disciplines, the counseling of teachers, both with colleagues and with deputies in teaching and methodological work can help.

To the question of the questionnaire "Whom did you apply for advice in the development (improvement) of the curricula in your discipline to?" the teachers' opinion was distributed in the following order (see Figure 8). From Figure 8 it can be seen that the number of teachers' appeals to employers and specialists of enterprises is almost the same as the appeals to the deputies for academic work. This indicates that teachers are aware of the need to restructure the teaching method of the disciplines taught by them, to strengthen its orientation to practice in accordance with the requirements.

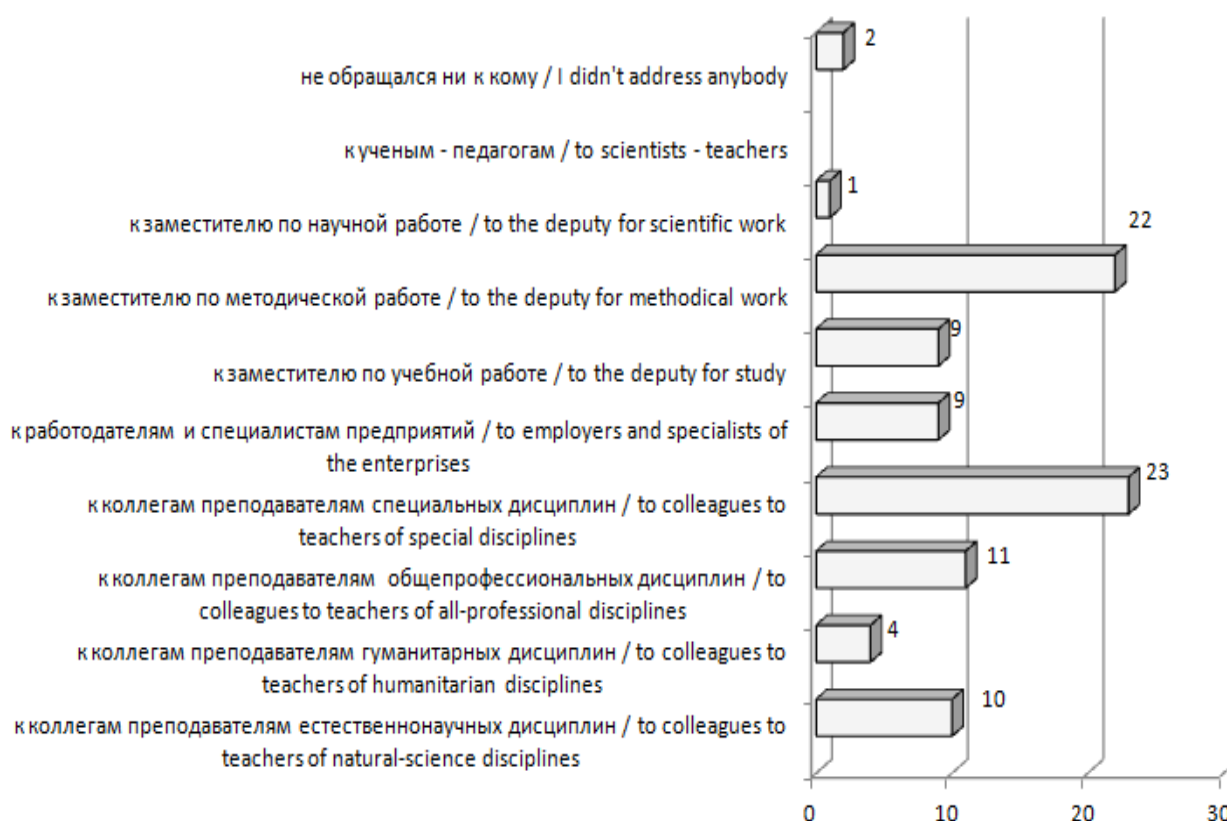


Figure 8 - The RT college teachers' opinion on the need for consultation in the development of the curriculum disciplines (the Republic of Tatarstan data)

The need to strengthen the practical orientation of teaching the subject (discipline) is noted by the majority of teachers (see Figure 9), which correlate with the data described above.

When asked about the improvement of teachers' training quality and qualification of assessed on a five-point scale, most respondents note (see Figure 10) the need to organize meetings with specialists in the relevant production sector and the possibility of creating conditions for further training of teachers. Still, teachers believe that the quality of education in colleges depends on the availability of modern technical training facilities.

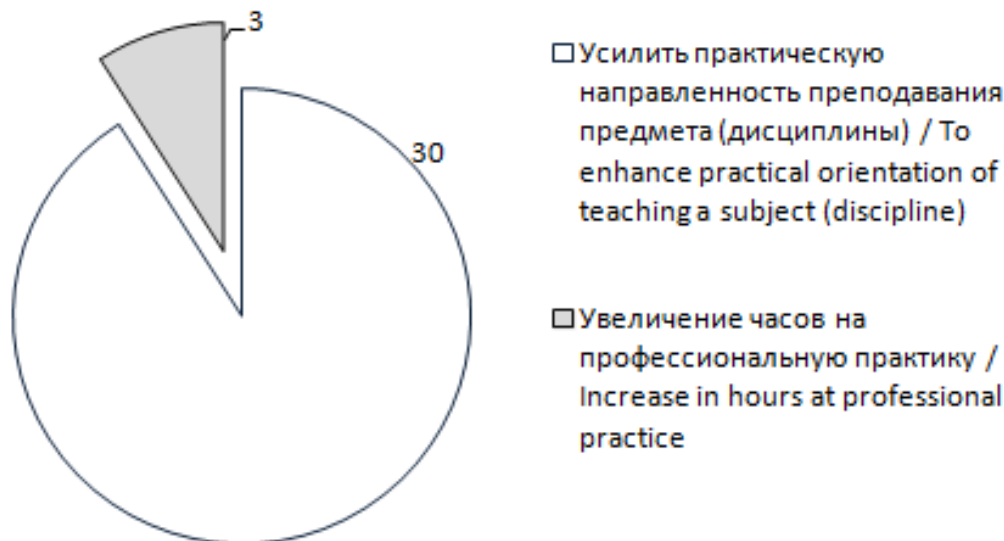


Figure 9 - The direction of improvement of quality of the taught disciplines taking into account the wishes of employers (the Republic of Tatarstan data)

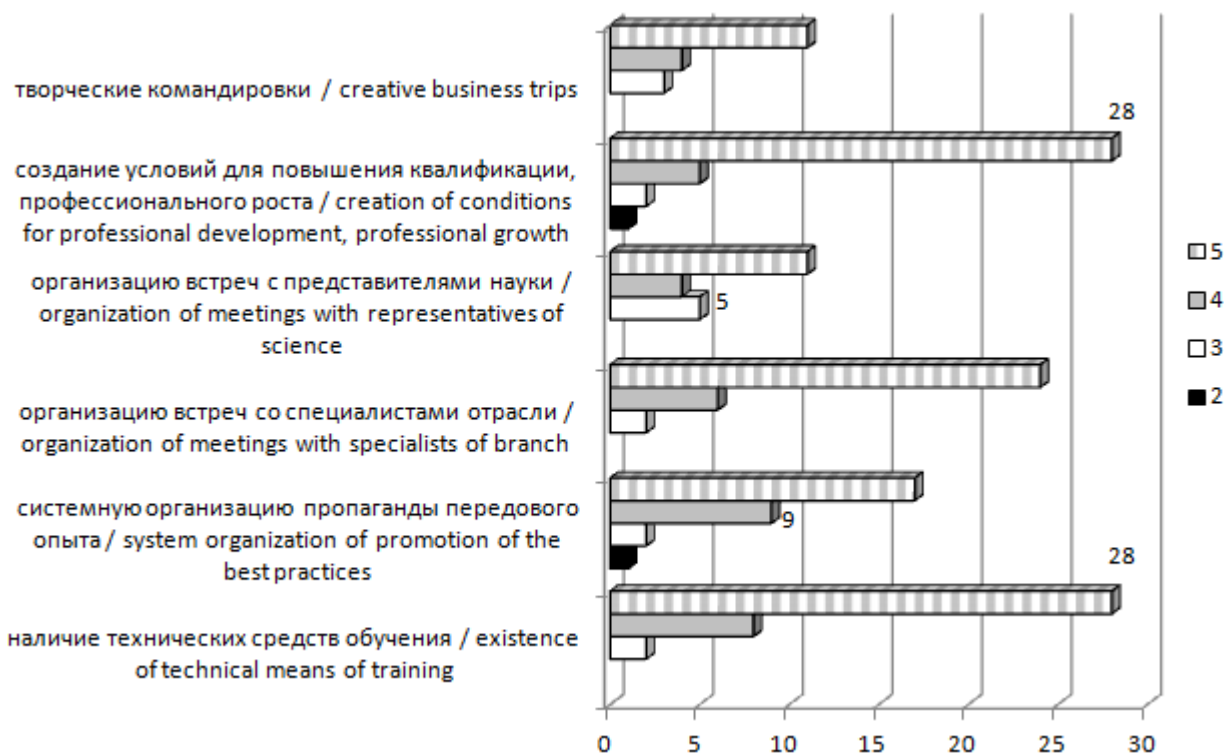


Figure 10 - Criteria of improvement of quality of training and qualification of teachers, on a five-point scale (the Republic of Tatarstan data)

Thus, it was revealed that transition to the fourth generation VET FSES puts before the teachers a problem of creation of conditions for ensuring implementation of requirements of the educational standard on formation of the general competences for the purpose of achievement of results of the standard of professional education. It is especially relevant in the conditions of division of the concepts "Results of Education (Training)" and "Professional Qualification" (PQ).

Discussion and conclusion

The conducted research has shown that even in such region as the Republic of Tatarstan which is characterized by rather high level of economic development the prevailing part of teachers of colleges is realized that natural-science and vocational training of the VET student has to meet the requirements of modern labor market according to ones of the developed professional standard.

The positive dynamics of teachers' opinion revealed in the course of the research demonstrates the need for change of the designing process of training courses of the natural science and professional cycle according to the integrative processes happening in the Russian secondary professional education at all levels: conceptual, technological, and procedural.

The conceptual level of natural science and vocational training design in the VET institutions is based on the requirements of the Copenhagen Process, on realization of the priority of vocational training development according to the Europe 2020 Strategy and the Federal Target Program of Education Development Concept for 2016 - 2020, on the State program "Development of education and science of the Republic of Tatarstan for 2014-2020 "(approved by the Resolution of the Cabinet of Ministers of the Republic of Tatarstan No. 220 dated February 1, 2014), the main goal of which is to ensure the high quality of education (in particular in the Republic of Tatarstan) in accordance with the demands of the region and the objectives of its economic development.

The technological level of design and implementation of modern natural science and vocational training in the VET institutions allows us to develop mechanisms and algorithms for competence-oriented design of training courses and technologies for their implementation, taking into account the level and profile of training.

The procedural level of the design leads the project activity into a real educational process.

The transition from level to level is built on the basis of reflexive analysis and constant feedback.

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Проблемы проектирования содержания учебных дисциплин в условиях внедрения профессиональных стандартов: опыт российских колледжей

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Аннотация

Цель статьи – изучение изменений процесса проектирования естественнонаучной и профессиональной подготовки обучающихся организаций среднего профессионального образования в условиях интеграции новых образовательных и профессиональных стандартов. Авторами проверена гипотеза взаимосвязи образовательных и профессиональных стандартов в системе среднего профессионального образования. Результаты исследования: теоретически обоснована и разработана методика изучения преподавательского мнения о внедрении интеграционных процессов в системе СПО на уровне региона. Динамика преподавательского мнения исследована при помощи адаптированного дидактического средства – анкеты, позволяющей описать как количественные, так и качественные характеристики происходящих интеграционных процессов. Изучены и проанализированы работы ученых, касающиеся развития современного российского профессионального образования в контексте Копенгагенский процесса и стратегии «Европа 2020» в условиях интеграции образовательного и профессионального стандартов. Обсуждение и заключения: исследование достаточно полно показало: даже в регионе с достаточно высоким уровнем экономического развития заинтересованная часть преподавателей пришла к пониманию того, что естественнонаучная и профессиональная подготовка студента СПО должна отвечать требованиям современного

рынка труда в соответствии с требованиями разработанного профессионального стандарта. Практическая значимость статьи заключается в выявленной положительной динамике преподавательского мнения о необходимости изменения процесса проектирования учебных курсов естественнонаучного и профессионального цикла в соответствии с интегративными процессами, на всех уровнях: концептуальном, технологическом, процессуальном. Результаты проведенного исследования могут быть полезны специалистам в области образования, а также интересны широкой общественности.

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Ключевые слова

Интеграция образовательных и профессиональных стандартов, среднее профессиональное образование, естественнонаучные знания, преподавательское мнение, педагогика.

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