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## Science Education: New Competences, Development Prospects and Teaching Methods.

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### ABSTRACT

Updating the Master's Degree programs, the basic ideas of updating the programs, the structure of the mechanisms of the program updating, the principles and conditions of the program updating. The article describes the main approaches of the mechanisms of updating the Master's Degree programs in science education in the pedagogical higher education institution. We consider the organizational-pedagogical conditions for the program updating. We suggest functional and procedural approaches to solving this problem.

**Keywords:** master's program in pedagogics, practice-oriented training, educational unit, network cooperation, professional competences, professional acts.

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## INTRODUCTION

As new competences in updating the Master's Degree programs in science education (hereinafter, the Master's Degree programs), we consider the control over the process of the goal-oriented changes in the Master's Degree program in connection with the requirements of conceptual documents, instruction-normative framework, the strategy of interaction with employers, institutional changes in the higher education institution and so on. The main signs pointing to the need to update the Master's Degree program in science education are low demand among the applicants, heterogeneity of the level of education of students, dissatisfaction with the quality of education by internal and external customers, the low profitability of the program. Updating the Master's Degree program is based on the applicable normative and legal requirements, active involvement of consumers and the interested parties at the stages of development, design and implementation of the program (the "vertical (functional) approach").

### Choice of the method

In the Master's Degree programs, it is necessary to update some or all of the elements (the "horizontal (procedure) approach"). To update the Master's Degree programs, there are used the available tools and/or the tools which need to be developed. Each element of updating the Master's Degree programs has its specific results and key indicators (for example, "the structure of the program" → working curriculum → conformity of the working curriculum to the requirements of the Federal State Educational Standards of Higher Education (FSES of HE), the conformity of the working program of the curriculum to the requirements of employers).

The indicator of one result of an element of the program updating can manifest itself in the indicator of another element (for example, the conformity of the working curriculum to the requirements of employers of the element "structure of the program" changes "the relationship between the forms of organization of student activity in the format and content of the work") (Larionova *et al*, 2014). For the updating scheme to work, one has to identify very clearly those skills that must be possessed by the pedagogues with the Master's Degree. They should be able to collect and analyze data on the student achievements, develop the knowledge measurement instruments, differentiate the teaching process, use the modern technical means of training and organize the groups of colleagues for professional development. Possibly, it will be required to prove out these competencies through Federal tests or professional exams (Sidorkin, 2013).

A prerequisite for updating the Master's Degree program is the implementation of the programs, allowing granting a double diploma, i. e. a diploma recognized in Russia and a partner country. It is expedient to develop the double diploma programs at the level of the Master's programs, because the students already have the basic professional training (Glazyrina, 2015). The process of stage-by-stage organization of updating the Master's Degree programs include the "stable elements": I – internal and external factors; II – the target section; III – the methodological section; IV – the procedural organizational section; V – the result evaluation section.

### Data and Methods

I. The need to update the Master's programs is conditioned by external and internal factors.

1. The external factors (the state of the higher education system, the instruction-regulatory requirements of labor, network forms of education, academic mobility of students, practical demand for the teaching staff in the region, interaction with employers, and so on.)
2. The internal institutional factors (taking into account the continuity of the basic professional education programs (BPEP) at all levels of higher education, motivation of teachers, qualifications and training level of teachers, the presence of additional education on the issues of modernization of teacher education, and so on).

II. According to the analysis of the Master's program factors, it is necessary to update [2, pp. 37-38]:

1. The goals of the programs. Besides focusing on the formation of the professional competences formulated in the FSES of HE, it is important to change the goal orientation of the professional activity of future teachers;
2. The planned results of mastering the educational programs. The result of mastering the professional modules should be student's mastering the experience in solving professional problems, the development of the capacity to design and realize the professional self-education;
3. the structure of the programs and their educational-methodical documentation (curriculum, academic calendar schedule, the work programs of disciplines (modules), educational practices). The structure of programs must be flexible and dynamic, adaptive to the social conditions of the region, the requirements of the population and employers;
4. The formats and content of education in the form of modular construction of programs, variability and alternativeness of disciplines. The implementation of the competence-based approach focuses attention on the activity content of education, forms of organization of the educational process, methods of organization of the student activity. Comprehensive assessment of the student's achievements. External independent evaluation of the learning outcomes;
5. Material-technical and financial-economic conditions of realization of the programs. The possibility of using e-learning, the use of distance technologies and electronic platforms. Upgrading the facilities and equipment of specialized classrooms, the training facilities of practices. Calculations of normative costs of providing educational services for the implementation of the program;
6. Teaching staff composition. The central functions of the teacher will be: the tutor functions to support work according to the individual plan and the organization of independent work; the functions of the organizer of educational environment by attracting diverse resources; the consultant functions in carrying out the projects, compiling portfolio and other types of independent work; expert functions in the independent assessment of an educational or real product, assisting in the adjustment of the obtained results and others. Updating the Master's programs is provided by the implementation of the following principles (Tolkacheva, Izotova, Volobueva, Paramonova, 2014): construction of activities on the basis of the end result, problematization of training, projective method of the knowledge presentation "from action to thought", productivity of actions and criterial evaluation, modular construction of programs;

III. Three groups should be identified among the organizational-pedagogical conditions of updating the Master's Degree BPEPs (Angrist, J. and V. Lavy, 2001).

1. The organizational-administrative conditions are directed towards interaction of the participants of the educational process. The development of instructional-regulative materials, involvement of the employers in order to determine the specifics of the basic professional educational program taking into account the labor market needs, the material and technical support of the educational process, monitoring of the quality of implementation of the Federal State Educational Standards of Higher Education 3+.
2. The organizational-methodical conditions are aimed at creating motivation of teachers to implement the ideas of renewal, improvement of professional skills of teachers, the development of innovative educational technologies in creative laboratories and temporary working groups.
3. The technological and pedagogical conditions include a system of using training methods (including electronic and distance ones) in the educational process, a system of management of the contact independent work of students and a system of evaluation of the level of formation of students' competences.

IV. Tools and evaluation of the key performance indicators of updating the program.

### CONCLUSION

In general, we conclude that the materials for evaluating the Master's Degree programs updating include: changes in the curricula, teaching-methodical complexes of programs, working programs of disciplines (modules), practices in accordance with the requirements of the FSES of HE 3+, professional standard of the teacher and demands of the labor market; actualization of teacher training programs; the involvement of employers into the educational process, etc. As the key target indicators of the system of quality assessment of updating the Master's programs, there can be: the conformity of the program to the normative regulations



and requirements of consumers, employment of graduates on the modern labor market in the region, the satisfaction of students and teachers.

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