Methodology of building a master’s individual educational route for effective development of professional competencies

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Abstract. The 21st century is characterized by the beginning of informatization and digital technologies. For a modern specialist to solve most problems, it is necessary to have a high level of professional competence and be receptive to innovation. The Bologna system provides for the opportunity to get a bachelor's degree in one direction, and finish a master's degree in another. Thus, the master's program can be applied to both bachelors and specialists who have a diploma in related fields of knowledge (in the same enlarged group of specialties), or completely from other fields of knowledge. Some bachelors and specialists often do not have the necessary knowledge to master a new specialty, which makes it necessary to form an individual educational route. Today, in the system of higher professional pedagogical education, students are given the opportunity to choose the subjects for the variable part of the working curriculum in accordance with the educational program for the training profile. In addition, you can get additional professional education through retraining programs. In this case, the student himself becomes the subject of designing an individual educational route, who chooses a certain additional educational program.

1. Introduction
The article considers the possibility of forming an individual educational route for the master's program. Thus, the individualization of the educational process comes into play, which has proven to be one of the most successful technologies for training masters. One of the variants of this method is proposed in this study. The goal is to develop a methodology for organizing the educational process, taking into account the individual educational route of the master to improve the quality of training [1,2]. One of the main tasks in achieving this goal is effective training based on professional competencies.

Currently, the master's program can be divided into 2 blocks of disciplines:
- the first block includes academic disciplines that form universal competencies and all masters are ready to master these disciplines, regardless of the direction of their previous training;
- the second block includes disciplines that form professional competencies that require, as a rule, special knowledge in the subject area. Masters that do not belong to an enlarged group of specialties are poorly prepared for the study of such disciplines.

The formation of an individual educational route (IER) should begin with testing students. Testing is aimed at finding out the level of basic knowledge in specialized disciplines [3-8]. The test is conducted at the beginning of each semester. The next step is to divide students into groups based on test results.

It is advisable to divide all students into three groups, depending on their readiness to master a particular discipline.

Group 1 – students who have continued their studies in a similar direction corresponding to their education. They are characterized by a high level of knowledge that allows them to study the chosen field of study in depth.
Group 2 – students who come from a different, similar direction and have a satisfactory level of knowledge that allows them to study according to a standard curriculum.

Group 3 – students who have received a bachelor's degree in a completely different specialty and do not have the necessary knowledge to master the curriculum.

Several problems directly related to the individualization for the student’s educational process were identified; they are shown in table 1.

**Table 1. Problems of individualization for student’s educational process.**

| №  | Group of problems                                      | Problem description                                                                                                                                 |
|----|--------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 1  | Lack of time and human resources in the formation of IER | An intuitive approach to IER building is not possible due to the lack of time for the teacher in the case of mass streaming training, when the teacher leads a large number of students. |
| 2  | Lack of mechanisms for identification of the student   | There is no standardization and understanding of the building student identification in the process of learning in the Internet, or distance education systems [9-12]. The availability of such mechanisms would allow the teacher or school administration to receive timely data on student performance and start searching for solutions to the issues that have arisen in electronic form. In other words, there is an untimely control of students, which leads to a violation of the building educational process. |
| 3  | Lack of standards for IER building                     | There is no single view on the structure and key parameters that are important in the formation of educational content, which will allow us to develop a new model for assessing students' knowledge and approaches to assessing the quality of teachers' work. |
| 4  | There is no system for grading students during transfers | There is no system for recording grades and evaluating students' knowledge when repeatedly retaking the material. When building an individual trajectory of a student with a prerequisite for increasing the quality of knowledge, the average assessment approach will not allow you to get reliable data on the basis of which you can make informed decisions and draw reliable conclusions about the quality of knowledge, see the eliminated gaps in knowledge, and also predict those areas that may cause difficulties in the future of the material for study. |

The main problem of traditional higher education is that it does not use strict statistical methods for evaluating the performance of educational institutions to make verified management decisions.

Thus, we can conclude that the combination of problems makes it difficult to implement a system of education personalization, in particular the IER use.

The proposed project should help the student determine the individual educational trajectory and the knowledge that needs to be obtained.

Figure 1 shows the recommended process of master's education, taking into account the individual educational route.
Figure 1. Recommended process of master's education.

Figure 2 shows an individual educational route for the third group of masters in the first year in the form of a Gantt chart (for example, the direction of "Applied Informatics").
Cells that reflect the period for independent study of the material are colored red, and cells that coincide with the study of disciplines in accordance with the curriculum are colored green.

Since masters from the third group do not have the necessary set of competencies, they are offered independent study of materials in LMS MOODLE to equalize the level of competencies [14-16]. So, before starting studying the discipline "Mathematical modeling", masters will be offered to study individual chapters of higher mathematics that contain the necessary information for further study of "Mathematical modeling".

For the second group of masters, there is no need for changes in the curriculum, so it will remain in the same state as at the moment.

For the first group of students, an advanced plan for studying the discipline is developed, based on independent creative tasks and cases.

To maximize the effectiveness of the proposed recommendations, it is necessary to start by adjusting the curriculum, so that in the first semester there are no disciplines that form professional competencies.

Before the start of training, students are divided into groups, voiced above, according to the level of knowledge, using entrance testing.

Then, after the distribution of masters, at the beginning of the first semester, with the help of a tutor, an individual educational route is developed for each group for the entire academic year.

Also, in the process of mastering a problem discipline, the master can get advice from the teacher who leads this discipline.

At the beginning of the second semester, the 2nd group and the 3rd group with basic knowledge begin the process of combining in order to study in the same group, since their level of knowledge at this stage should be equal. The advanced group at this stage receives independent creative tasks for personal improvement of the acquired knowledge and skills, and is also appointed as a consultant to the 3rd group, so that the most successful students can help other colleagues.

At the beginning of each semester, a test is conducted again to determine which group the student belongs to according to the level of competencies development.

These measures will lead to a significant increase in the level of competencies development and the quality of knowledge obtained.

2. Results
The curriculum should take into account the methods and opportunities for monitoring and evaluating the results of educational activities, the distribution of hours, create so-called universal educational activities, prepare and develop students’ ability to simultaneously and jointly work with the team and
the teacher, create the foundations of moral behavior and correct relationships with people around them and society.

Every year, new specialties are accredited, dictated by the needs of the business community. Employers of the Krasnoyarsk region express interest in specialists with work experience, so the university should take into account the implementation of professional competencies by the graduate, regardless of the educational initial level. The proposed method allows you to take into account the difference in preparation to level it "at the end".

3. Conclusion
The success of higher education institutions today is largely determined by the effectiveness of the implementation of master's programs, which is directly related to the fact that since 2011, the two-level system of higher professional education has become mandatory from recommendation.

It is obvious that new educational results are quite difficult to achieve at the level of traditional scientific and methodological support for the process of training specialists. Individualization of educational services is required. We need innovative methods, technologies and forms of training (including distance learning), a new level of teachers and masters’ readiness in the organization of educational activities and professional development.

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