Development of a management system for educational projects in the context of distance education

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Abstract. In 1975 A.D. Ursul introduced the concept of "information explosion" to denote a constant increase in the speed and volume of information on the planetary scale. The information crisis was consequence of this explosion - a decrease in the efficiency of information use, when the existing methods of searching, collecting, processing, storing information do not allow to use all its enormous potential. Scientists who do not have time to keep track of recent publications in their specialization were the first who faced this problem. But now this problem has captured almost all types of human activity. In education, this has led to the introduction of new technologies. The distance learning one of them. By creating new opportunities for access to information, this form also creates new problems. The design and transmission of the theoretical block is simplified, but the organization of practical classes and the passage of all types of practices requires the creation of new methods of interaction between students and teachers. The decrease in the number and intensity of personal contacts in distance learning makes it problematic to form many types of competencies that require direct participation in activities. The article is devoted to one of the ways to solve this problem - the use of tools and methods of project management and solving problems in the organization of distance education. It analyzes both existing experience and proposes tools from the field of project management and quality management that have not been previously used in education.

1. Introduction

Although the learning process is currently quite formalized and standardized, this does not lead to the expected improvement in the quality of education and does not allow to solve the problem of organizing educational content taking into account the use of digital technologies.

The use of project management methodology and tools for solving problems that have proven themselves in economic activity can increase the effectiveness of the learning process, especially in the formation of competencies and skills related to practical activities. This toolkit can be used both for organizing distance education in general and for developing specific projects to include them in teaching various disciplines.

With the help of project management tools and tools of the concept of solving problems, it is possible to trace the processes of the distance education, and also, on the basis of fixing the spent time and resources, evaluate the activities and even calculate the self-cost of the final educational service. Problem solving tools such as A3 (8D) and QRQC are suggested to solve problems which are hard to forecast. A3 is a visualization tool of a problem and a variant of its solution, which allows to solve problems which they do not have a ready-made solution at the current time [1, 2]. 8D is a method...
developed by the Ford Motor Company for analyzing and solving problems typically associated with improving product or process quality.

The use of these methods will make it possible to assess the quality of education on an ongoing basis to solve complex, systemic problems. The QRQC (Quick Response to Quality Control) tool will improve the standard process on an ongoing basis [3].

2. Description of the problem being solved

The problem that existed earlier, but as a result of the massive transition of education to distance learning in connection with GOVID-19, has become evident - the inability to guarantee the declared quality. This is due to many reasons, but it is possible to record the low quality of management of formal processes: education, project management, management of practical tasks and implementation of operational management.

Although the impossibility of a simple mechanical transfer of the methods and content of courses to electronic media without loss of quality was obvious more than twenty years ago, the development of distance education methods was of a point nature and was initiated by a small number of enthusiasts [4, 5]. For most teachers, working with electronic educational platforms was only an additional burden initiated by the leadership. When training the teaching staff on new information technologies, the main emphasis was on the formation of technical skills in working with resources. By default, it was assumed that the instructors were competent enough to handle the course content and translate it into the new format.

After the announcement of the transition to the distance learning, the system of Russian higher education was blocked by the following factors: the quality of the Internet, the lack of a single electronic system even within the framework of one university, which would allow to organize all forms of study, the ambiguous understanding of tasks by the participants in the process. The problem of conducting practical trainings, laboratory work, that is, those elements of the educational process that most require feedback, turned out to be especially serious. This is due to the following features of the functioning of higher education.

1. The traditional approach is based on the personal presence of the teacher at the time of the process management. The format of the webinars, partly due to the technical features of the conduct, partly due to the teachers' unwillingness to adapt the form of the presentation of the material, led to the "collapse" of the content part and its primitivization. It was not possible to determine the interest of the students in the lecture. Students could not fully communicate with the teacher, they only perceived speech. At the same time, the speed and form of perception is different for each person.

In addition, the majority of teachers with a traditional teaching system have fine-tuned skills in direct contact with students. In the conditions of a sudden transition to distance learning, they became hostages of the situation: they did not have time to rebuild themselves in a "new way", which created an emotional, mental and moral load on everyone. Thus, some professors complained that an hour in front of a video camera is more difficult for a teacher than a working day in front of a large audience face-to-face.

2. The reliability and quality of information technology in conditions of increased workload has shown its unavailability. For example, the website www.gosuslugi.ru. At the time of the announcement of support for families with children on the payment of funds from June 1, 2020, everyone rushed to fill in applications, but could not do it within 2-3 days, because the server simply "hung" due to the increased load. The same thing happened with the educational platforms of universities at the time of peak loads.

3. The quality and form of educational material that is entered on the educational platform is not regulated in any way. As a rule, this is the same material that was used in full-time education. The requirements for adapting the material to distance education have not been developed. Each participant in the process understands information and enters it at his own discretion. As a result, discipline materials are presented in different formats. For example, one teacher gives links to sources, another one- uploads text documents, the third - presentations, etc. This content can be located in different
sections of the platform, and it takes time for learners to understand the structure of the course, which is unique in each case.

The volume of tasks that students managed to follow the curriculum in the conditions of standard training and in conditions of distance learning was not controlled by anyone. At the moment when, without receiving feedback, a student has to wait from 30 minutes to 2 weeks, the opportunity to correct the work and submit it in a timely manner for review slipped to an uncontrollable deadline.

In this regard, it is advisable to think about taking the necessary measures to improve the processes of distance education in conditions of uncertainty.

3. Use of project management methods and problem solving in the organization of distance education

The transition to a new form of education is a major project for which it is necessary to calculate the necessary labor resources, human capital, equipment, material, working methods and the environment. The 4M + 1E (Man, Machine, Method, Material + Environment) method allows to divide the analysis of factors affecting the final result into relatively independent groups. For each of the factors, problems are formulated that are predicted during the implementation of the project. Practice shows that it is not always possible to achieve the assigned tasks, in reality, daily problems arise to be dealt with. Therefore, the benefit of using problem solving tools is to minimize losses in the educational process or in the material and information flow. Losses can be associated with human capital. It is reflected in the low competence of personnel and their poor-quality training. The losses associated with the purchase of low-quality material, from stationery to software, can be estimated by analyzing equipment downtime and failures. There are losses associated with working methods. In this case, methods are all educational standards, curriculum, work programs, methodologies, etc. that govern the work of the higher education system.

Based on the quality management methodology, all these losses can be identified and eliminated from the distance education system only if the root causes of these losses are found. This can be accomplished by analyzing and looking for root causes using problem solving tools such as the A3 QRQC. These methods are based on the Edwards Deming PDCA (Plan-Do-Check / Learn-Act) method. The Deming cycle, which provides us with guidance on the path to improvement, is also known as the Shewhart cycle, PDCA cycle, and PDSA cycle. Deming refers to it as the Shewhart cycle, as his idea appears to have its source in Shewhart's 1939 book.

The main advantages of the A3 method for solving complex systemic problems can be highlighted:

- logical process of thinking;
- objectivity;
- result and process;
- synthesis and visualization;
- consistency;
- a system approach, not a point of view.

The logical thinking process A3 Thinking allows to see the difference between the cause and the effect, since the ability not to distinguish between the cause and the effect leads to erroneous decisions and the problem remains in its place.

Objectivity also plays an important role, because each person sees and gives only a subjective assessment. Every person's mental picture is that "why should my opinion be wrong?" People want to solve the problem, maybe sincerely, but when they begin to study the problem in detail, disputes and stoppers begin, the reason is "I'm always right!" In addition, the search for the cause is often replaced by the search for the culprit. In the meantime, the problem has not been resolved, and people are punished and thus generate a desire to hide problems, not overcome them.

Standardized work is the best way to eliminate problems. the problem arises because we do things differently each time. This methodology allows us to improve the quality of process management
through efficiency, effectiveness, and reduced variability. After solving complex systemic problems and bringing the process to the standard and continuous improvement, it is necessary to connect another method for solving QRQC problems, or in other words, to understand the 3 realities (3R):

- real place: where and when the problem occurred;
- real deviations: what is actually a nonconformity with the standard;
- reality: is there data on this non-conformity.

Continuity of the process of improving distance education services using the QRQC method will allow to achieve high quality indicators of the process and consumers satisfaction. If the proposed approach is consistently implemented, then the following positive changes in the education system can be expected:

- Expanding the range of consumers of educational services, including hard-to-reach, sparsely populated regions, in districts, remote scientific and cultural centers.
- The quality of listeners, students and schoolchildren will increase, regardless of their location.
- It will allow to create additional jobs for personnel, to improve the learning processes of distance education, developers and manufacturers of technical means.
- Special courses will help solve the problem of employment and help improve the level of specialists, respond more quickly to changing social, epidemiological and economic conditions.
- Timely feedback for users of the system can channel people’s energy in a constructive direction and have a positive impact on reducing social tension.
- Provide the opportunity to receive basic and additional education under Russian programs for the Russian and Russian-speaking population of foreign countries.
- It will significantly reduce the cost of training specialists.
- It will allow providing high-tech production with orders for technical equipment.
- It will provide foreign countries with educational services of a new type, based on new technologies, and the state will be able to receive new foreign exchange earnings.
- It will ensure the promotion of new Russian educational, information and communication technologies on the world market, which will give an economic effect and raise the prestige of our country on the world stage.

![Figure 1. The main tasks of the participants in training projects.](image-url)
The starting point for the project management and problem solving in distance education is training all project participants in project management methodology and problem-solving tools. A training project is proposed as a possible method that should help all parties concerned learn the principles of project management and assess the quality of the proposed approach. It can be used independently, as an element of the curriculum in the preparation of students in social and economic subjects, and as a tool that allows to qualitatively evaluate distance education technologies in general. This method, which has been repeatedly used in training [6], assumes that the project is considered as a means of developing competencies generated in the design process. The list of them is specified and modified in various educational practices. Figure 1 shows their roles.

Student group: The project-based learning is focused on the activities of an independent student - an individual, a couple, a group. They do it for a certain period of time. The instructor can suggest sources of information, but can simply guide students' ideas in the right direction for further exploration. But as a result, students independently and jointly solve the problem, applying the necessary knowledge, often from different areas, get real and tangible results. All work on a problem thus acquires the contours of project activity.

Teacher: The project-based teaching methodology requires a change in the role of the teacher, who becomes a cooperating teacher, rather than a bearer of ready-made knowledge. The design approach requires the same creation of an appropriate educational environment, including access to some new information technology. The task of the teacher is to form a project passport, which contains the following information: the name of the project, the purpose and objectives of the project, the project manager, the subject on which the project is being worked on, and subjects close to the theme of the project.

Employer on the project: The employer on the project is interested in the project if the employees do not have enough time and resources for research and strategic projects. If desired, graduate students can be viewed as potential future employees who are already familiar with the company's problems. In addition, in some cases, one can develop an unexpected, fresh approach to old problems.

The challenges faced by the education system around the world require a search for new approaches and methods. Project management is one of the tools that allows you to solve problems related to the content of education and its organization.

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