

Application of flexible methods of project management in teaching mathematics

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The modern process of teaching mathematical disciplines is a fairly structured and cyclical process. The general path of a pupil at school in mathematics, algebra and geometry lessons consists of conveyor belt sharpening of the necessary skills and their interpretation in real life situations with the accumulation of certain experience.

However, such a learning algorithm has significant drawbacks, which are associated with a low level of maneuverability of the teacher and pupil during learning. Of course, the choice of different levels of program complexity is a rather conditional characteristic of maneuverability.

The development of modern communications, technologies and approaches allows a broader view of the society development and education. These elements constantly enter the learning process and make it simpler, clearer.

However, the global superstructure practically does not change, it is not flexible in its essence, gradually the traditional education system loses its leading position.

It can be replaced by practically oriented, effective counterparts of their time, which have already proven themselves as effective mechanisms of interaction between people and technologies. It is about technologies of project management flexible methods (or Agile methodologies) [1].

Their main principle is focused on working group members, who should become highly organized teams. The basis of the idea is people, their knowledge and readiness for changes and adaptation to them [2]. In the educational process of mathematics, the participants of the working group can be considered teachers and pupils who, in the course of their activities, go through the same stages that are offered as part of the Agile methodology.

In the framework of teaching mathematics, the teacher faces the task of improving the quality of work performance and educational process by pupils. This can be done through understanding and interest in the subject. This idea is strongly correlated with the Kanban method of working time management, the principles of which can be taken as the basis of structural changes in the teaching of mathematical disciplines cycle.

In the theory of Kanban the continuous structure of the work process (learning) and the element of its visualization, the Kanban board, plays a key role. This board allows to visualize the work (learning) through the flow «Planned to do», «In progress», «Done».

Now it is worth determining which processes Kanban can allow to change in the teaching of mathematics. The results and their characteristics are conveniently presented in the table. 1.

Table 1 – Predicted results of using Kanban in the study of mathematical disciplines

Application result	Characteristic
Visualization of the learning process	When studying each topic, the teacher and pupils visualize the list of tasks that will be studied within the framework of the local topic, pupils are maximally involved in their studies
Restrictions on new tasks	New tasks are not added to the board until pupils have learned the basic theoretical and practical elements
Keeping the board up-to-date	The overall learning process is constantly monitored by both the teacher and the pupils
Continuous learning improvement	Participants of the educational process are familiar with their own progress, this allows updating and improving knowledge
Availability of feedback between participants	Participants receive constant feedback from the teacher and other pupils
Understanding the «borders» of the educational process	Participants understand what the training plan for a specific topic will be and can calculate their own strength for different types of loads

A significant drawback of using this method is the lack of a clear time frame for studying the topic. In such a situation, the teacher should take a key role in organizing the learning process and offer recommended time frames for learning.

Considering the work with project management in school education, it is important to consider key features and parameters that are easily integrated into the high school value system. Here are the more detailed points:

1. The student and the teacher act as the main and equal participants in the educational process. There is often a conflict between the authoritarian approach of the teacher and the emphasis on student needs. Project management reduces this difference by making process participants equal. The teacher's role turns into a mentor who supports and guides students' work.

2. Detailing of the educational process and focus on goals. The teacher and students work together on real problems. While working with practical tasks, the teacher gives the students theoretical material and directions for solving problems.

3. Effective action planning. The teacher and students divide the project into small stages, controlling their implementation. The distribution of roles in a group project helps to clearly delineate tasks and coordinate resources.

4. Risk management. Check-points allow you to monitor the progress of students. Initially, the teacher acts as a leader-manager, but over time his role decreases, because equal participation of the team is assumed.

5. Mutual learning, cooperation and evaluation. Cooperation promotes the development of mutual assistance and the avoidance of misunderstandings, allowing each student to actively contribute to the result. Mistakes become an important stage that contributes to the development of adequate self-esteem and self-realization.

6. Responsibility of each participant. This contributes to the formation of a responsible attitude to activities and respect for the work of others, the development of logical thinking and the prediction of consequences.

7. Development of flexibility, adaptability and self-discipline. Project management helps to shape strategies and tactics, changing them in the future.

It is clear that the implementation of these principles is possible only in an educational environment where everyone is interested in achieving successful results. However, this can cause some problems due to:

1. Different level of students' mathematical preparation.
2. Different motivational factors of students.

Therefore, such an approach can be used as a pilot project for the implementation of conceptual changes in the traditional system of teaching the cycle of mathematical disciplines.

References:

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