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Improving the Effectiveness of Teaching Programming Based on Creative Methods

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Abstract: In this research paper, the latest advances in the use of creative methods in the educational process are studied and analyzed. Ways of actively applying highly effective modern educational and innovative technologies to the educational process are highlighted. To increase the effectiveness of teaching programming, the application of creative methods has been developed. The practical aspects of applying creative methods and their functional tasks to teaching programming are explored.

Keywords: Creative methods, Educational process, Teaching programming, Creativity in teaching programming, pedagogical methods.

Currently, the use of information and Communication Technologies is the same as its use not only in the socio-economic sphere, but also in education, its application in such important socio-political processes as public administration, state and community relations, the provision of public services to citizens. The future of each society is determined by its integral part and to what extent the educational system, which is a vital necessity, has developed. Today, the reform and improvement of the non-absolute educational system of our country, which is following the path of independent development, its elevation to a new level of quality, the introduction of advanced pedagogical and information technologies and the improvement of educational efficiency have risen to the level of Public Policy. One of the most basic tamoils of digitization and automation is the implementation of quality training in the basics of programming. In order to teach the basics of programming, it will be advisable to divide the learners into classes in the first place.

1st class. Starters (school students in Grades 7-9). At this stage, we can use the following methods, taking into account the age of students.

- **Puzzle** – method**.** In this method, the teacher receives a properly structured program and replaces it with lines and links it to students. In turn, students will have to find errors in the program and correct them;

- **Hand tracing (step verification)** – method. In this way, the teacher receives the text of the correctly structured program and demonstrates the process of its gradual execution and the values adopted by the variables in the form of a table. In the reader, a complete understanding of the program and interest increases.

2nd class. Middle class (academic high school and vocational college students). In this class, students will be aware of programming and it is advisable to use the following methods for them:

- **Teamwork** – method. In this method, students are divided into subgroups and each group is assigned a captain. A small project or issue will be put in the middle by the teacher, and each jomoa will have to approach in his own way and achieve the result.
- **Work in pairs –** method**.** In this method, students are divided into pairs and complete the task given by the teacher.

Both of the above methods form students' ability to work as a team and convey their ideas to their teammates. In addition, their interest in programming will increase.

3rd class. Advanced class (Students of higher educational institutions). This class is considered very important, in which it will be necessary to form the ability to work independently of students. It is also possible to apply to the students of this class, in part, the methods mentioned above. But the " Automata approach " method is more effective. In this method, students examine the assignments given using automated systems and reach the level of achieving the most correct solution. We can give examples of such a system http://acmtuit.uz/, http://algo.ubtuit.uz . The system that automatically tests the correctness of the software solution is designed for conducting intellectual programming competitions and for distance education. The testing system can be used to perform the following tasks: 1) preparing for and holding republican and international intellectual competitions (Internet, intranet, face-to-face); 2) conducting laboratory and practical training in programming subjects. The software solution sent by the participant is automatically checked by the system.

The basics of programming are based on the following steps:

- Design. A logical solution to the problem.
- Projection. Requires knowledge of the programming language,namely:
- Semantic – the hidden meaning of a programming language construct;
- Syntax – presentation of constructions.
- Testing.Checking the achieved result.

The stages mentioned above are interrelated and complement each other. Unlike the above, teaching programming should be approached with the following steps:

- Programming language;
- Testing;
- Design.

First of all, the student develops knowledge and skills in the programming language, then learns how to test the compiled program and find the best solution, and revise its design to sell the software product. If we teach programming subjects in the above order, I think that its effectiveness will be higher than we think, and it will help the development of mature programmers for the future of our country.

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Below we describe some of the technologies that can be used in the teaching of the programming fundamentals module, and give methodological recommendations on the procedure for conducting some of them..

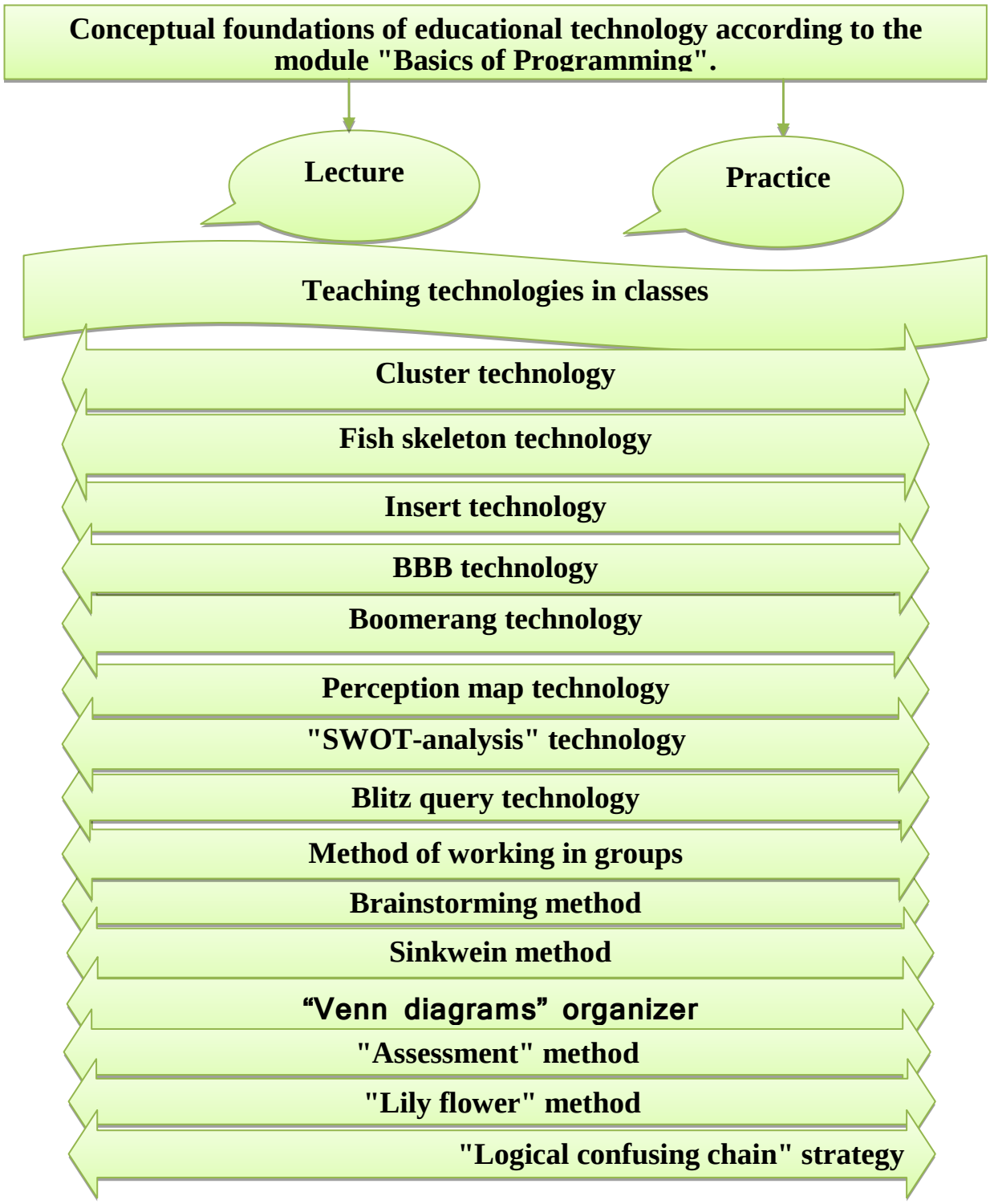

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Figure 1. «Fundamentals of programming» conceptual foundations of educational technology according to the module

On the basis of the above pedagogical technologies, it is possible to increase the effectiveness of teaching the basics of programming.

Through the following scheme, it is possible to show the methods, tools and technologies that develop the qualities of creativity in pedagogues.

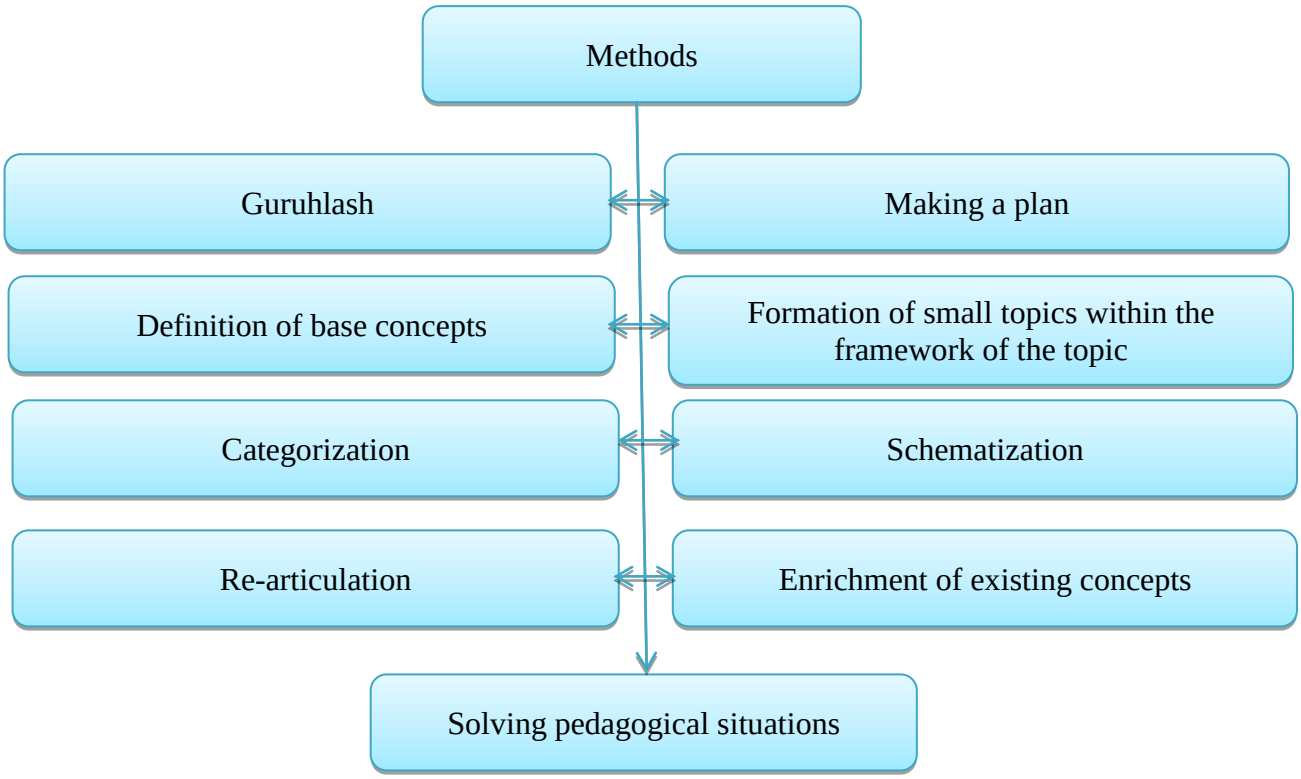

Figure 2. Methods, tools and technologies that develop the qualities of creativity in pedagogues

The role of interactive methods in increasing creationism is incomparable. The method of perceptual mapping from interactive methods allows you to increase the creativity of the student based on the development of intelligence.

Conclusion

Allows you to increase creativity in teaching the basics of programming. Self-development and self-expression of each pedagogue is directly related to his creativity. Usually, the ability of educators to creativeness is ensured through the desire to solve pedagogical problems, the implementation of research work or scientific projects and the achievement of mutual creative cooperation. The need to make decisions on innovative and creative approaches to the teaching process leads to the development of creative pedagogy.

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