

PRINCIPLES OF DETERMINING THE NECESSITY AND ESSENCE OF TEACHING PROGRAMMING LANGUAGES TO SCHOOLCHILDREN IN THE FIELD OF INFORMATICS AND INFORMATION TECHNOLOGIES

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Annotation

The ubiquitous transition to high-tech systems in all aspects of human activity has led to an increase in demand for specialists who are able not only to service such systems, but also to improve and develop new ones. What tools should be used for teaching? Based on the analysis of the requirements of educational and professional standards developed in accordance with the requirements of employers and the realities of the information society, a unified approach to the organization of programming education in schools is presented.

Keywords: Differentiated, Teaching using the basics of programming, processes, assignments.

This is the level of enrichment of the information-educational environment, which has a significant impact on the development of the integration of various activities carried out by schoolchildren, and at the same time ensures the improvement of the educational process, taking into account their personal requests.

"Computing Curricula" project, which is used in the field of training of different levels of IT specialists, is among the proposed global projects on teaching computer science and information technologies and IT science. The recommendations, developed in cooperation with professional societies of programmers of ACM and IEEE Computer Society, reflect modern approaches to teaching computer science and information technologies.

There are two tasks of teaching informatics and information technologies and IT science in general secondary schools: forming the way of thinking of students and improving teaching methods.

Algorithmization and programming training related to the formation of higher-level thinking skills will definitely have a positive effect on teaching the basics of programming in Informatics and Information Technology and IT science.

In general secondary schools, interest in the programming process and the need to increase the quality of teaching programming, which is carried out in the field of "Informatics and information technologies and IT" at the professional level, development of the society in the currently complicated socio-economic conditions and technological achievements leads to creation in all spheres of human activity.

During the educational process, students learn algorithmic elements and forms of algorithm presentation (block diagram structure, programming language syntax). It should be noted that relying only on numerical values in the educational process completely reduces interest in programming, does not allow operators to demonstrate special features in their professional activities, and does not provide opportunities to implement knowledge in practice. That said, from our point of view, too much time is spent typing the program text and getting to grips with the programming environment interface.

Applying modern programming languages to the school education process will automatically raise the level and quality of computer science and information technology education and meet society's demand for highly qualified specialists in the future.

After studying the work experience of the teachers who teach the "Programming" section as part of the computer and information technology course of the school, we can conclude that the following programming languages are the most popular: Python, C++.

The main stage of the beginning of training is the technology of teaching programming. The teacher should not forget that the purpose of teaching is not to learn the programming language and train highly qualified programmers, but to learn programming methods, algorithms and methods for solving problems, that is, to inculcate the skills of algorithmic thinking.

The issues of the researched department of computer science and information technologies include the acquisition of educational materials for the operation software of electronic computing machines (EHM). If we clarify the topics of the issue further, then it is necessary to pay attention to the thinking of the word "programming" itself, and as its meaning it is necessary to understand such a process that the result obtained during its implementation is a program created in DT should be.

The process of developing system software and programming system tools is traditionally called system programming and includes application development (application programming). Currently, various paradigms of programming are used, which, in turn, differ in their teaching, characterized by a number of important features. The main programming paradigms involved are those shown in Figure 1.

The process of mastering programming offered as part of the curriculum traditionally includes the following three modules:

Module 1 is aimed at mastering methods, with the help of which the development of calculation algorithms is carried out;

Module 2 includes direct acquisition of DT;

3 modules combine mastery of a specific programming system and practical application.

From our point of view, when mastering the alphabet of programming, it is necessary to systematically complicate the structure of the used algorithms, using typical examples,

following the principle of sequence. All problems used in practical education can be classified according to the features of the algorithmic structure (see Fig. 3).

It is necessary to pay attention to the sequence of education, it is very important in our opinion. During the training of the repetition command, the first step should be the introduction of the loop with an intermediate condition, because such a sequence allows students to first think about the command included in the general loop, and then form the condition for repeating it. will give. In this case, if the prerequisite cycle is introduced first, then the student will need to perform the mentioned action at the same time, which will have a negative effect on the level of effectiveness of the educational process.

Thus, the implementation of the intermediate condition cycle can be considered as a preparatory stage, during which the basis for students to "get into" mastering is formed. Such an approach allows to effectively achieve the given parameter of educational goals when passing to the next form (analogue) of the command to demonstrate knowledge and repetition. As part of the activities carried out in the process of pedagogical influence, it is necessary to pay special attention to distinguishing and showing for students the special forms of cycle forms used in the process of checking the condition and returning to the previously performed action. It should be noted that the body of the loop can be executed once in the intermediate condition, only one repetition is important, and it should be noted that if the conditional loop command is used, it can be omitted at all.

One of the concepts that students are required to acquire is the environment of the programming system, which should be understood as the current situation as seen on the screen (in the system shell). In this case, the pedagogue should explain and demonstrate to the students the environment of that programming system, with which it is possible to carry out actions within the framework of a specific mastered topic. The important modes of the programming system environment can be distinguished as those shown in Figure 4.

It should be noted that the editing mode is often set automatically during the installation process of the system, during which the text editor connected to the system is running. Text data entered into the program can be prepared with other text editor tools designed for text creation. Next mode □ compilation mode, used in the group of compiled languages (Pascal, C, Fortran, etc.), the program executed using machine language commands is included as a result of compilation. Most program execution results in two steps: Step 1 involves only compilation; Phase 2 involves interactive editing.

The execution mode is to execute the program in machine commands after the program is displayed, and it is implemented in YuDDT by means of the interpreter.

Mode for working with files, in which the text of the program written in the given language is stored. Then, as soon as the above steps are completed, the live broadcast will be performed and the input value and results will be fixed.

In file mode, traditional operations are performed, i.e. saving data, transferring data to RAM, naming a file, etc. Also, within this mode, it is possible to execute the command to print the information located in the editor window, that is, the command that establishes interaction with the printer.

In the help mode, explanatory support is provided to the program executor by displaying comments on the screen. Such explanatory aids make it easier for the programmer to perform operations with the system and DT.

In the Otladka mode programming system, programming is sufficiently developed from the point of view of professionalism. This mode allows you to perform tracing, step-by-step execution of the program, monitoring of changes in certain parameters, setting the end point of the execution of the program (place, condition). All of the above is possible because there are tools designed to search for possible algorithmic errors in the program.

Thus, the Informatics and Information Technologies training course, which is implemented in the primary school education process, made it possible to solve the issue of acquiring basic (basic) knowledge about algorithm elements. If we refer to the requirements of our DST intended for students of grades 5-10, the issues presented in Figure 1 are given as the results of mastering the fields of science.

The current standard Informatics and information technology training course (grades 5-6) was given as a school component, and for grades 9-11 as a basic course. Based on the required results, it can be concluded that students understand the concept of "algorithm" and its properties at the main written stages of acquiring knowledge in the field of "Informatics and Information Technologies". The formation of "algorithmic culture" is carried out in the content of the knowledge components provided in the educational course, within the framework of which the perception of the computer as a universal processing tool, that is, as a tool for learning, is formed.

After completing the programming chapter, students should know the following:

- what is an algorithm, what is the role of an algorithm in control systems;
- what are the main features of the algorithm;
- methods of writing algorithms: schemes, educational algorithmic language;
- basic algorithmic structures: following, branching, multiple choice, cycle, algorithmic structures;
- defining auxiliary algorithms, complex algorithm construction technologies: sequential detailing method and collection (library) method;
- the main properties of quantities in information processing algorithms: what is the name, type, value of the quantity; the meaning of the assignment;
- performing algorithm monitoring for a certain performer;

- can create simple linear, branching and cyclic control algorithms in one of the training programs;
- separation of small tasks, identification of auxiliary algorithms and their use;
- creating simple programs for solving calculation problems with numbers;
- simple dialog programming;
- work in the environment of one of the programming systems (for example, Python);
- program debugging and testing, etc.

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