

The Current State of the Teaching of Programming Languages in "Information and Information Technology" in European General Secondary Schools.

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Annotation: The article analyzes the regular teaching of modern programming languages in secondary schools of European countries.

Key words: Algorithm basics and programming, Programming language, Pascal, Python, Scratch.

The teaching of informatics and information technologies in general secondary schools has two tasks: formation of students' way of thinking and improvement of teaching methods.

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.

The "Computing Curricula" project, which is used in the field of training of different levels of IT specialists, is among the proposed global projects for teaching computer science and information technologies. 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.

Algorithmization and programming training related to the formation of high-level thinking skills will definitely have a positive effect on teaching the basics of programming in Computer Science and Information Technology.

A programming language is the basis of a programmer's work. However, knowledge of one language is not enough, an expert must understand different programming paradigms. The Computing Curricula 2013 standard has eleven sections in the field of "programming languages", six of which are core. For example, the hour allocated for learning "programming languages" is half of the total hour.

The USA is considered the creator of computer science, and various computer programs, algorithms and programming languages are developed by them. There are educational programs in the country that allow high school students to study programming and see their future in IT.

In Great Britain, the situation is a little different, "little geniuses" learn to create simple programs from the age of five, and from the age of eleven, schoolchildren learn various algorithms and at least two programming languages. Schoolchildren first learn the basics of computer literacy, specifically educational programs designed to learn how to work with computers as users.

In France, since 2014, the mass introduction of Informatics and information technology courses for elementary school students has begun. In extracurricular activities, students learn to familiarize themselves with the basics of computer literacy and the creation of simple applications.

And in Australian schools, the curriculum for Informatics and information technologies has been fundamentally revised, and the basics of programming have begun to appear in schoolchildren from the third grade. Starting from the seventh grade, schoolchildren learn one of the usual programming languages, and in high school, it is planned to teach the basics of object-oriented programming.

In Finland, the fundamentals of practical programming are included in the school curriculum, with students learning visual programming environments such as Scratch in high school, and visual object-oriented programming environments in elementary and middle school.

In Russia, elementary school students are introduced to the elements of the LogoWriter programming language. In the upper grades, it is prescribed to teach the basics of object-oriented programming.

Interest in the process of programming in secondary schools of general education and the need to increase the quality of teaching programming in the field of "Informatics and Information Technologies" at

the professional level, the development of society in the currently complicated socio-economic conditions and technological achievements in human life activities leads to creation in all areas.

As one of the components acquired by students, the subject "Algorithmization basics and programming" can be specified. The basis of knowledge in the field of programming is formed by the part called the introductory course, students understand the alphabet of algorithms and programming (Pascal, Python,) in the process of acquiring it, the motivational organizer of the educational process is aimed at acquiring knowledge of computer modeling, graphics, step by step. develops.

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.

The above stated that it is necessary to focus on the search for the most optimal of the existing methods from the point of view of the formation of important competences, and to practice the methods of activities aimed at solving everyday problems in accordance with the main directions of modernizing the knowledge, abilities and general education acquired during education. allows to apply. Thus, the choice of the programming environment that is most convenient for learning, visualized in the educational process, and meets the requirements of cross-platform is the first priority.

The inclusion of Scratch in the educational process predetermines the selection of the environment, allows you to master the basic algorithmic constructions and obtain a sufficiently stable knowledge. Thanks to powerful hardware, it is possible to create animations and games using this environment. During the activity in the Scratch system, students develop effective socialization skills, which is reflected in the following:

- 1) creative thinking;
- 2) collective and individual skills in learning;
- 3) acquisition of systematic analysis experiences;
- 4) planning, forecasting (forecasting) and implementation of individual projects;
- 5) choosing an adequate strategy aimed at solving the given problem.

Mastering Scratch allows students to overcome learning barriers to mastering the basics of algorithms and programming in the future, and the acquisition of knowledge allows them to successfully use programming in the future at a professional level. During the organization of training sessions, it is necessary to define the language and programming methods as the main goal, and to focus on the systematic approach to problem solving.

Currently existing programming languages have some differences, which are based on differences in syntax and algorithmic thinking. Achieving a high level of development of algorithmic thinking makes it possible to complete step-by-step without obstacles during the acquisition of a programming language. Also, it is necessary to follow the requirements set by the principle "from simple to complex".

In order for a programming language to be "first", it should be simple, have an intuitive (emotional) syntax, have high-level equipment, be able to detect errors, warn them when they appear, correct "rule violations". should be quality documentation with examples, t should be characterized by friendly environments that promote cross-platform compatibility.

The experience of using different programming environments in the educational process helps to master the Processing language, which highly satisfies the requirements of the "first" programming language. The mentioned language includes a multimedia programming language, which is highly necessary for the work of specialists such as artists, designers, architects and programmers, characterized by a wide functional possibility in terms of the variety of the use of creative equipment.

Processing is provided as a free cross-platform software that can be used on almost all platforms, for example: Windows, Linux, Mac OSX. First of all, this language, intended for implementation in an educational environment, is used to attract students' attention to computer literacy, that is, as an effective tool for creating a finished professional work. The openness and simplicity of the language allows it to be widely used in educational activities.

The Processing language uses the capabilities of the Java language as the basis for creating interactive visual effects. As the basis of the processing language, the capabilities of the Java language are used to create interactive visual effects. With a bit of padding, a relatively adequate SketchBook production environment is created, including a language reference and a collection of examples.

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.

In the conditions of the rapid growth of informatization in the modern world, there is a need to train highly qualified specialists in the field of information technologies with skills in cross-platform programming languages. In this regard, the importance of the "Algorithmization and programming" section in the school's Informatics and Information Technology course is increasing, because schoolchildren not only acquire programming skills, but also develop algorithmic and critical thinking, and in addition, to identify the most talented students, there is a vocational orientation of school students in IT technologies. However, developing programming as part of school lessons is not effective because students acquire skills that are not suitable for practical application. In this regard, a question arises.

After studying the work experience of real 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: Pascal and Basic. But they are practically dead and not used for writing modern programs. Therefore, it is necessary to introduce new programming languages into the educational process. Take a look at the main modern programming languages and try to decide which language is best for you to learn in school.

The Python programming language is a high-level, interpreted language that supports a variety of programming paradigms (structured, object-oriented, etc.). Python uses dynamic data typing. It has a very simple and concise syntax, so code written by one programmer is easy to read by others. Individual parts of the program can be checked, which is a definite plus. Python has a huge collection of add-on modules, as well as a huge functionality and standard library. Disadvantages of the language are the long execution time of algorithms compared to other programming languages, as well as the problem of using data types in large projects.

Currently, the Go (Golang) server-side programming language, which appeared in 2009, is gaining popularity. The syntax of the language is very clean and stable. Go supports high performance and parallel programming. The language is open source and has a BSD-like license that allows commercial use as well as free distribution and personal use of the language. The main disadvantages of the language are the lack of fixed language constructs and the need to pay attention to the architecture of the program. This language can be used for further study in specialized classes, but as a first programming language it is very unsuccessful.

Thus, today the Python programming language is considered the most successful for learning, but at the same time, the learning process faces a number of difficulties:

lack of teaching materials, as well as at least the basic language constructions and their characteristics of teachers of Informatics and information technologies.

Every teacher should take into account the following points when teaching programming languages in Informatics and information technology classes at school:

- information technology does not stand still, but develops very quickly, so it is worth revising the exemplary work programs in Informatics and information technology every year, paying special attention to the "Programming" chapter;
- paying attention to modern languages that are becoming popular, abandoning outdated programming languages;
- gradation in order to individualize the choice of language among students who plan to connect their activities with the IT field in the future and students of non-main classes;
- focus not only on learning program commands, but also on the development of technologies for connecting modules, the basics of working with different versions.

The next important stage of creating a learning system for the topic "Algorithmization and programming" is the organization of the educational process itself. Traditional types of training can be

distinguished as the main types of organization of the programming teaching process: lecture, laboratory and practical training. You need to choose the appropriate teaching, technical and software to conduct the lessons.

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.

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