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Educational Issue
Въпроси на преподаването

SEVERAL OPPORTUNITIES FOR IMPLEMENTING THE TRAINING IN "COMPUTER MODELING AND INFORMATION TECHNOLOGIES" IN THE 7TH GRADE

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Abstract. The article discusses some programming environments that can be applied in the 7th grade "Computer Modeling" classes. Attention is paid to the new active programs in the discipline "Computer Modeling and Information Technologies". A study was conducted to track the attitudes of teachers related to teaching a scripted text programming language in 7th grade.

Keywords: computer modeling; informatics training; Python for middle school

1. Introduction

In the last ten years, trends in the IT sector have directed the attention of specialists to the increasingly widespread use of modern high-level programming languages. Their continuous integration enabled expansion of their potential and increased the need for more specialists in the field.

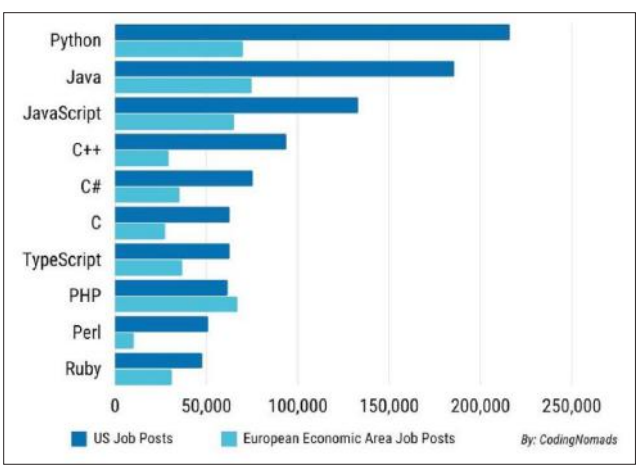

Figure 1. Greatest number of job across the U.S. and Europe (Whitney 2022)

One of the most dominant scripting languages in the recent years is Python. According to the latest data collected by a number of trend platforms (Whitney 2022), the greatest demand for specialists in Europe and the USA was aimed precisely at programmers who know languages shown on Fig. 1.

In this sense, learning the Python language in the Bulgarian school will give "basic knowledge and programming skills as a prerequisite for today's students to be able to easily use in the future." (Stefanova&Stefanov 2021).

This article describes some possible programming environments for the Python language, connected with the study of „Computer Modeling" in grade 7. The presented technical capabilities can successfully achieve the main expected results stated in the curriculum. The easy access and intuitive interface is a good prerequisite for quick and easy assimilation of new knowledge.

2. Exposition

According to the current curricula approved in 2020, the study of the scripting language (Python, JavaScript, etc.) begins to become recognizable already at the junior high school stage through the new study subject "Computer Modeling and Information Technologies". As early as sixth grade, albeit at the level of "Moving from a block-based programming language to a scripting text-based language" (Computer Modeling Curriculum 6th 2020[1]) and "Comparing the capabilities of block-based programming languages and scripting text-based languages" (Computer Modeling Curriculum 6th 2020[1]), challenges come to the fore that they will seek their solution first.

In the seventh grade, the main emphasis is placed on working with a "scripted textual programming language" (Computer Modeling Curriculum 7th 2020[2]), through which to look at different types of data and to implement tasks with repetitive actions.

On the one hand, teachers have the need to familiarize themselves with the peculiarities of this language and acquire the necessary experience to pass on to their students. And on the other hand, to create conditions for its integration and teaching in school computer rooms. The ultimate goal is to build the trainees "basic digital competences that everyone must have in order to successfully cope in the modern technological society" (Yovcheva 2018).

Why is Python the leading scripting language currently being studied? One of the main reasons why this language is preferred over other scripting languages is that it is used to write "simple, efficient programs with great speed" (Brigs 2019). Limited characters are used when creating programs. Many libraries can be used with wide applicability in different fields.The program code written in Python is usually shorter then code written in other languages. Example of printing all numbers ending with 7 in the interval (1, 70) is shown on Fig.2.

Teaching the Python language can be implemented through various programming environments – Integrated Development Environment (IDE). One of the popular environments is PyCharm, which is freely distributed. It resembles well-known scripting language environments, making it quickly adaptable.

Here, the writing of the code begins with the creation of an empty project, which can contain "one or more Python source files (.py), configuration files, and other resources."

(Nakov 2018). After running the code, the result is visualized in an environment console, and if an error occurred, the type of error and the line it is on.

```
for i in range (1,70):
    if i%10==7:
        print(i)
```

Figure 2. Implementation through the Python language

The main disadvantages of this IDE is the installation of a Python interpreter, which may be incompatible with the system requirements of the operating system. Another problem that can be encountered is the operation of PyCharm in a network environment. Computer rooms in which multipoint servers have lower performance can actually slow down or completely reject the possibility of working some of the terminal stations.

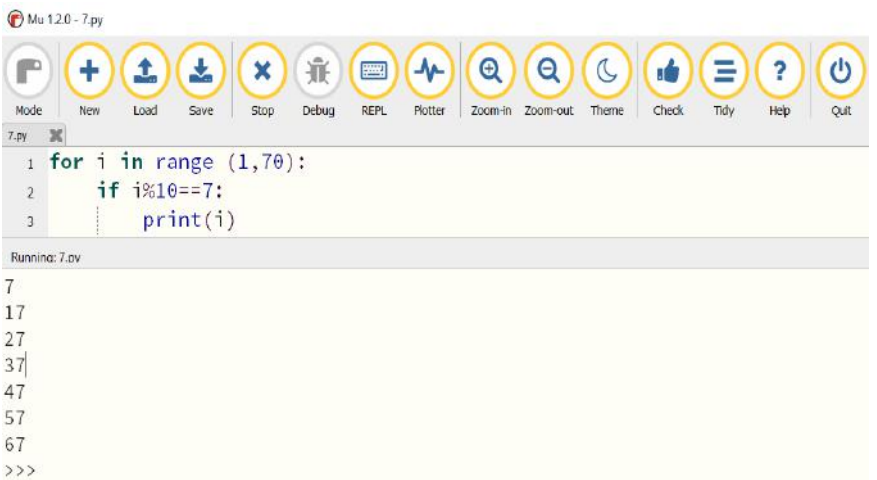

Figure 3. Python code editor interface

Another offline environment that can be used in learning Python is the Mu Editor. The environment is free and with low system requirements. Its interface is very intuitive as "the main functions are located in a "button bar"[3] (the user interface of Mu Editor is shown on Fir. 3). And here for convenience, the numbering of the lines of the code is visualized in the left part of the working area. If it is necessary to work with more than one file, the environment organizes each open file into a separate section.

Another approach that can be applied in Computer Modeling classes is the use of online platforms. This capability will allow teachers to conduct adequate training regardless of the type of computer room and digital devices. Online platforms offer quick and easy access to a working environment and visualization of the obtained results. Access in most cases is completely free, and some of the functions that can be seen are: choosing a scripting language, sharing code, downloading the created codes.

The use of different programming environments will diversify traditional learning, which "is aimed at acquiring knowledge and skills in a strictly structured and relatively static educational environment" (Georgieva&Tuparova 2019).

The experience that educators gained during the COVID-19 pandemic would facilitate their work using such web platforms.

In order to explore the attitudes of teachers related to the teaching of script language in the 7th grade, a survey was conducted among teachers with many years of experience, in the cities of Shumen, VelikoTarnovo, Karlovo, Pirdop, Dobrich and Sofia. Some of these teachers are teachers at the School Telerik Academy, others have prestigious awards for their contribution to education, others have been awarded as innovative teachers.When asked what scripting language they prefer to teach, 87.5% of teachers prefer it to be Python (Fig. 4).

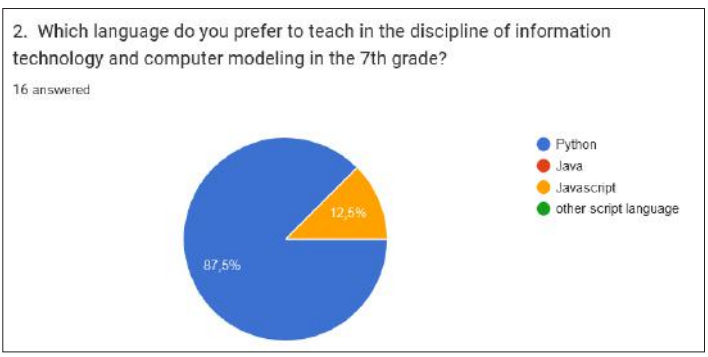

Figure 4. Choosing a scripting language

Whatever the environment for teaching Python, just over half of them prefer it to be an online platform rather than using a desktop environment (Fig. 5).

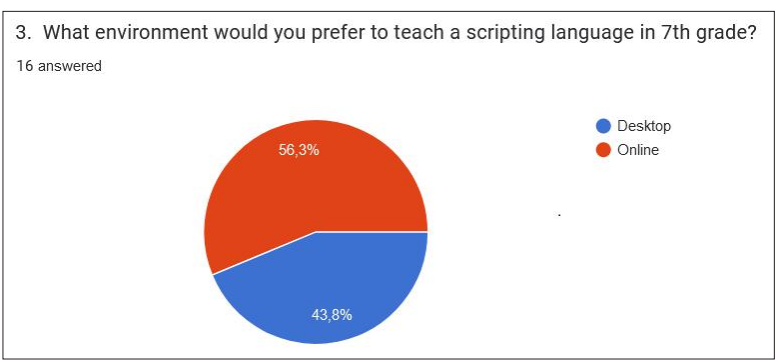

Figure 5. Choose a desktop or online teaching environment

Regarding the question related to the computer equipment available to the teachers in the "Information Technologies and Computer Modeling" classes, 37.5% of them indicated that the training will take place in multipoint classrooms (Fig. 6).

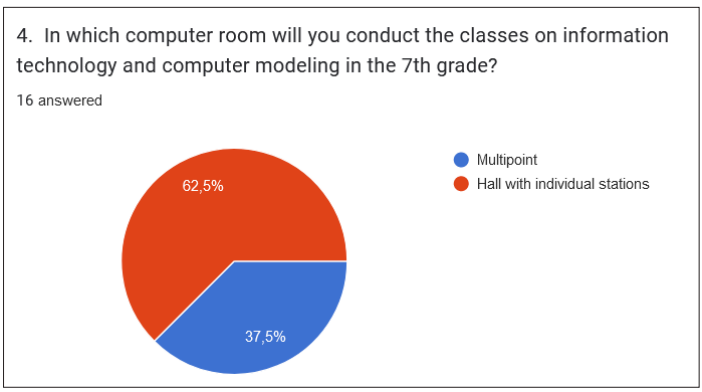

Figure 6. Type of computer room

From the research done in this way, it can be summarized that teachers prefer to teach the scripting language Python in the subject "Computer Modeling" provided in the 7th grade. Whether the programming environment is online or installed on computer stations, the choice is equal. Perhaps after the first year or two the experience of the teachers will give a clearer judgment as to what kind of learning environment will be most suitable.

The fact that a large proportion of teachers teach in computer rooms with separate computer stations may bias their attitudes toward using a desktop environment in their classes.

3. Conclusion

In conclusion, we can say that desktop and online programming environments have their advantages and disadvantages, but in general, teachers have the attitude to use online environments as a teaching tool. This, in turn, will ensure a more accessible approach to teaching in face-to-face or distance learning. On the other hand, desktop applications are independent of Internet support and would be preferred where computer rooms have the necessary technical security.

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NOTES

1. https://mon.bg/upload/24187/UP_PC-modelirane-6kl.pdf.[Viewed 2022-10-28].
2. https://mon.bg/upload/24188/UP_PC-modelirane-7kl.pdf. [Viewed 2022-10-28].
3. https://www.onlinegdb.com/online_python_compiler, [Viewed 28.10.2022].

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