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FEATURES OF TEACHING THE PYGAME MODULE IN COMPUTER SCIENCE FOR GRADES 6–7: METHODOLOGICAL AND PEDAGOGICAL ANALYSIS

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The modern paradigm of school education in computer science is focused on developing sustainable, practice-oriented knowledge and skills among students. In the context of the digitalization of the educational process, the integration of visual programming and game-based learning becomes increasingly relevant. In this regard, the Pygame library—a specialized module of the Python programming language designed for developing 2D computer games—occupies a prominent place. The purpose of this article is to identify the methodological, pedagogical, and age-psychological characteristics of studying the Pygame module by students in grades 6–7 within the framework of the school computer science curriculum.

Theoretical Foundations of Pygame in School Informatics

The use of Pygame in educational settings provides an opportunity to integrate several key areas of learning:

- the development of basic programming competencies in Python;
- the cultivation of algorithmic and logical thinking;
- the acquisition of principles of graphical and event-driven programming;
- - an introduction to object-oriented programming paradigms.

Furthermore, using Pygame as an instructional tool enables the implementation of the activity-based learning approach, which involves students actively in the learning process through modeling, experimentation, and reflection.

Age-Related and Cognitive Characteristics of Learners

According to psychological and pedagogical literature (e.g., Leontiev, Vygotsky, Elkonin), students in grades 6–7 are in a transitional stage from concrete-operational to abstract-logical thinking. This necessitates the use of visual and interactive instructional methods that stimulate cognitive development. Programming based on visualized objects, as is characteristic of Pygame, is well-aligned with the developmental abilities of learners at this stage.

Methodological Approaches to Integrating Pygame into the Educational Process

Stage 1. Propaedeutics: Preparatory Phase

In the preparatory phase, it is advisable to ensure the development of primary programming skills in Python, including:

- syntax (variables, operators, functions);
- control flow (conditionals, loops);
- working with libraries and modules.

The culmination of this phase is the installation of the Pygame library and the execution of a test script that opens an application window.

Stage 2. Fundamentals of Visualization and Event Modeling

At this stage, students are introduced to the coordinate system in Pygame, drawing functions for graphical primitives, loading and displaying sprites, and the basics of the event loop. Recommended assignments include:

- modeling simple visual scenes (landscapes, interfaces);
- implementing keyboard and mouse controls for objects;
- animating object movement and interaction.

Stage 3. Project-Based Activities

The final stage involves project-based learning, during which students develop mini-games based on predefined or self-formulated scenarios. Example assignments include:

- "Gravity Catcher": a game simulating falling objects;
- "Interactive Maze": navigation and obstacle implementation;
- "Dynamic Arcade": incorporating score counters, timers, and win conditions.

Teaching Methodologies in Informatics Using Pygame

Within the context of teaching Pygame in computer science classes for grades 6–7, the following methodologies can be identified:

1. Constructivist Approach (Project-Based Learning): Emphasizes creating complete products (games), promoting learning through hands-on project development rather than isolated content acquisition.
2. Interactive Learning: Involves visual programming elements, active demonstration methods, simulations, and real-time feedback to enhance comprehension.
3. Case Method: Analyzing specific examples of mini-games and deconstructing their logic helps students grasp abstract concepts more effectively.
4. Differentiated Instruction: Tasks are tailored to different proficiency levels, from templated exercises to individual creative projects.
5. Heuristic Dialogue Method: Used during task formulation, logic analysis, and reflection, guiding learners to discover knowledge through inquiry and discussion.
6. Modular Instruction: The curriculum is segmented into interconnected thematic modules, each with objectives, methods, tasks, and assessment criteria.
7. Use of Mind Maps and Algorithmic Schemes: Aids in visualizing game logic and the behavior algorithms of objects.

The integrated use of these methodologies ensures a high level of material assimilation, development of 21st-century skills, and sustained learning motivation.

Tools and Resources

To effectively implement Pygame-based instruction, it is recommended to use:

- specialized IDEs (Thonny, PyCharm Edu);
- online code editors (Replit, Trinket);
- instructional cards, interactive guides, and code snippets.

Systematic methodological support should be organized in the form of step-by-step manuals, advanced-level tasks, and reflective exercises.

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THEORETICAL FOUNDATIONS OF USING THE POSSIBILITIES OF INFORMATION TECHNOLOGIES IN MATHEMATICS LESSONS

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The purpose of using a computer in a math lesson is to develop an interdisciplinary relationship between mathematics and computer science, develop computer literacy, and develop the student's self - study skills in the classroom. The use of ICT in mathematics lessons allows the teacher to save time on teaching materials due to visibility, test students ' knowledge in an interactive mode, develop intelligence, and improve the student's information culture [1].

The concept of using information technologies means using various computer programs and technical means and making them as effective as possible for use. Multimedia technologies can be considered as an explanatory and illustrative method of teaching, which is used to convey educational material to students through the use of vision and to make their perception more productive. The use of multimedia technologies in the classroom does not radically change the structure of the lesson. In the structure of the lesson, all the main stages are preserved for a long time, only their description changes over time. It should be noted that in this case, the motivation period increases and becomes cognitive [2].

This is a necessary condition for the result of learning, because imagination is essential for the creative activity of the student in order to replenish knowledge. Structural convergence of a multimedia presentation with the use of hypertext links develops consistency and the ability to analyze. Thus, the multimedia presentation effectively and effectively corresponds to the didactic purpose of the lesson. In mathematics lessons, you can consider two types of ICT applications:

- multimedia illustrations;
- use the ability of multimedia tools for interactive communication.

When analyzing the basics of the theory of information technology in mathematics lessons, of course, along with the requirements for any subject, subject features should be taken into account.

Computer technologies provide the following opportunities: to gain time in more intensive learning, to make the lesson attractive and diverse, visual, to involve all students in the learning process, to introduce innovations using computer technology, to develop creative abilities and skills of independent work of students.

Today, as practice shows, with the right type and ability to use a set of information technologies, it is possible to achieve the required level of quality of education.