REQUIREMENTS AND CREATION STEPS FOR AN ELECTRONIC ENVIRONMENT THAT TEACHES GENERAL HIGH SCHOOL STUDENTS WEB PROGRAMMING

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Annotation: The article discusses the structure of the learning environment in the learning process, the requirements, objectives of the learning process, the principles of the learning environment, the stages and classification of the creation of the learning environment, web competencies formed in teaching based on the learning environment.

Keywords: Educational electronic environment, requirements, goals, principles, stages, Web-programming, competence.

In many foreign countries, reforms in the field of education based on the introduction of e-learning technologies have risen to the level of public policy. For example, in the United States, where a new strategy for the development of the education system has been adopted, from digital libraries in the process of transition from classroom and library teaching to online learning, in France the main task of the national education system is ICT in all areas of education: from kindergarten to adulthood. Special e-learning programs are being implemented in Korea, which has become a key tool for modernizing education.

The general methodological model of the electronic environment for teaching web programming takes into account different ways of using computer training programs in the process of teaching web programming. Therefore, a possible classification of computer training programs on various grounds is under consideration. Thus, the e-learning environment can be divided into the following types according to its role in the learning process:

- Monoprogram for one lesson;
- complex (modular) programs consisting of modules for transferring fragments of an entire set of classes combined with a common problem.

The proposed Web programming learning environment can have the following objectives in the process of teaching Web programming:

- Comprehensively implements the goals of formation, education and development of students' knowledge in web programming classes;
- The main purpose of the formation of students' knowledge is based on the organization of active independent activities of students to obtain, understand, systematize and evaluate educational information;
- develops skills aimed at teaching schoolchildren the methods of educational activities;
- focuses on realizing the educational potential of Web programming on the basis of emotional impact;
- monitoring and diagnostic programs - aimed at obtaining information about student achievement in the process of teaching Web programming and identifying problems in learning;
- Correction programs - aimed at closing the gaps in knowledge and skills of school students in the study of the basic course of Web programming.

An electronic environment that teaches web programming should follow the following principles:

1. The principle of modularity: the study material is divided into parts, consisting of modules, the size is minimal, but the content is closed in terms of content.

2. Principle of completeness: each module should have the following main components: theoretical core, examples, theory management questions, skills development tasks and exercises, control tasks to check practical exercises, control tasks (work) during the module, training material assist in mastering.

3. Principle of clarity: each module should include one or more screen frames with minimal text and maximum visualization, which makes it easier to understand and memorize the study material.

4. The branching principle: each module must be linked to other modules with hypertext links so that the reader can connect to other modules so that they can choose to switch to any other module voluntarily, according to their transition recommendations.

5. The principle of regulation: the student himself manages the exchange of frames, which is able to call any module or any of its components on the screen (theoretical core, for example, the task of self-management of any complexity).

6. Principle of flexibility: the student should be able to independently change the depth, breadth and complexity of the material being studied, including the transition to the appropriate question structure, discipline, as well as the appropriate modules.

7. The principle of computer (smartphone) support: the student should, if necessary, focus on the main essence of the studied material, free from the usual tasks that allow to perform, refer to existing computational tasks or references, or repeat the solution of more problems.

8. The principle of aggregation: the teaching electronic environment should aggregate into electronic complexes, expanding and supplementing them with new sections and topics.

Today, the creation of any computer program, and especially educational electronic environments, is inconceivable without a well-thought-out development plan. There is currently a developed methodology for creating a computer-based learning system. Like any design methodology, it involves a series of sequential steps. Each of them has a specific time interval and is calculated as a percentage of the total time of program development. We will look at these steps and the goals that have been achieved on them [4]:

Phase 1: A technical proposal developed based on educational needs and learning objectives - this phase analyzes the status of the use of advanced learning systems in the educational process. Nowadays, there are many types of high quality software designed for use in the learning process in the computer training systems market. They are produced by local and (mostly) foreign manufacturers [5].

Phase 2: development planning, timing, financing and resolving issues related to the composition of the development team - where the individual stages of development and the timing of the implementation of the product as a whole are determined, the final date of its release is set. The following table allows you to adapt to the challenges that arise in the development process, manage or manage delays, connect or release resources, and redistribute them between individual stages of development.

The issue of project financing is one of the most important issues in the process of creating any software product.

Phase 3: Course content development - at this stage, the curriculum and student content are analyzed, course strategy is defined, the program scenario and interactive interaction with users is developed.

The developed teaching electronic environment is designed for independent work of secondary school students in the classroom to study the logical foundations of Web programming theory. Its creation is aimed at providing all the theoretical materials provided by the electronic environment for teaching Web programming, as well as practical assignments and test questions for self-examination.

In order to determine the level of compatibility and effectiveness of such an implementation in the form of a teaching electronic environment for the practical application of the proposed theoretical material, I analyzed the theoretical material in the section "Fundamentals of Web Programming", "Web Design".

In the course of the analysis, it was found that this theoretical material can be effectively presented in the form of a teaching electronic environment. This conclusion is based on the fact that this theoretical material is clearly structured, clearly practical-oriented, and provides ample opportunities for students to work independently.

Step 4: Course Description - Here is a description of all the information parts of the course: text, animation, sound, practical exercises, tests, code editor and video to get the result of the program.

The proposed learning environment is divided into several interconnected parts, each of which has its own function and has the following blocks as a separate module [1, 2]:

- registration block - the teacher performs the function of registration of students using the electronic environment. To do this, the program is required at the end of the training session to compile a list of students who have worked with the teaching electronic environment and their successes in this work;

- block for studying theoretical material - here students are offered theoretical materials on the studied topic, divided into chapters and screens. Built-in navigation tools allow you to move freely around the site and find the information they are interested in;

- a set of examples of solved problems - where students can see in their independent work ways to solve practical problems on a given topic to solve similar examples;

- A block of control questions, tests and assignments, including a set of questions on the topic, at the end of the training students should know the answers to all questions, as well as they must solve several practical tasks and get answers, the system will be able to evaluate the success of training;

- A block of assignments for independent work is a set of tasks recommended for students to solve independently to strengthen theoretical material and practical skills.

Step 5: Implementation of the course - this step involves the selection and direct programming of hardware and software platforms using a web programming system.

How the analysis was conducted and how its results were presented are described in detail in the following paragraphs.

Phase 6: Experimentation and Testing - At this stage, testing of the developed learning environment begins, with a series of tests conducted to detect programming errors. After a series of hardware compliance checks, the quality control team will issue its conclusion and provide a list of deficiencies identified during testing that developers need to correct. And this is repeated several times until the final version of the product is obtained, more or less devoid of flaws and errors.

All of this applies to the recommended electronic environment to a large extent. In the process of creating it, it is necessary to make several changes and additions, both in the program code itself and in the design of the menu and interface. This process is quite lengthy and cannot be considered complete even now, as the creation of a complete system is done during repeated modifications and adaptations. But in general, the product can be considered ready for practical use in the learning process [2].

Phase 7: Operation and Implementation - At this stage, a complete web training program for web programming has been introduced in educational institutions. Using this system, a lesson plan is created and its operation begins.

In conclusion, as a result of mastering Web programming, general secondary school students will have the following skills and competencies: solve practical problems through the stages of solving problems related to the arithmetic and logic of computers; develops algorithmic thinking necessary for professional activity [2, 3]; have algorithm design and recording skills for a particular executor; masters one of the programming languages and uses it in practice; creates simple web pages; uses appropriate programs for data formation and systematization, tables, graphs, diagrams, data processing; the ability to choose and process the method of data presentation is formed; prepares presentations independently, using multimedia capabilities on various topics;

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