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Research Article

ISSUES OF USING NEW INFORMATION AND COMMUNICATION TECHNOLOGIES IN TEACHING THE COURSE "METHODS OF TEACHING BIOLOGY" AT UNIVERSITIES

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ABSTRACT

The article covers current issues of using new information and communication technologies in teaching the course "Methods of teaching biology" at universities. The principles and criteria for the selection and use of computer tools, the conditions of their integrated use are given.

KEYWORDS

Activation of student learning activities, increase of educational efficiency, didactic functions of technologies, computer means, favorable conditions, principles, criteria.

INTRODUCTION

Numerous works of Methodist scholars have been devoted to the choice of traditional teaching aids, and this issue is much more elaborated today. [1-4].

The problem of using YATV in the educational process attracts the attention not only of researchers in the field of pedagogy and psychology, but also of all specialists in society, employees of the education system. Currently, the IEEE P / 484.1 / D8 standard has been developed by the International Organization for Standardization (ISO) for licensing information systems in education.

However, the issue of the use of YaATVs in education has not been sufficiently developed by didactics and methodologists in the following decades. principles of

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selection and use of conditions of their complex application and the criteria were left out of the scholars 'attention (except for some points in the work devoted to other problems).

In determining the main categories that define the characteristics of the creation, selection, role and use of the means of IED in the educational process, they can be divided into the following groups:

1) sanitary-hygienic and ergonomic requirements;

2) didactic and methodological principles (defined for the traditional educational process).

3. Psychological-pedagogical, didactic, methodological requirements for the creation and use of DPVs.

4. Principles of computer training.

MATERIALS AND METHODS

Sanitary-hygienic and ergonomic requirements are sufficiently detailed in the normative documents and in the work of researchers.

We will consider separately the principles of effective use of traditional teaching aids and new information technology tools in teaching the course of biology teaching methods.

In particular, according to J.O. Tolipova [5-6], a wide range of information technology capabilities provides:

- facilitates the free access of each student or teacher to the information that forms the subject of study at the institution;

- ensuring reliable storage and necessary processing of information;

- able to manage reliable feedback and cognitive activity;

- allow teachers and students to work independently, creatively, including original research activities;

- providing individualization and differentiation of teaching, taking into account the innate abilities and developing abilities of students;

- requires the introduction of teaching aids that allow a wide range of communication between students, teachers, representatives of different cultures of the region and the country.

V.A. Smirnov [7] identified the leading ideas that form the basis for the development of methods for the use of YATV in teaching biology:

1. Radical change in the content of biological education in connection with the informatization of society, as well as advances in medicine, biological sciences and production based on the use of living organisms.

2. To form the ability to search and actively use and analyze all possible sources of biological information as the main goal of biological education, which is constantly advancing biological culture.

3. Environmental education as one of the ways to implement the concepts of sustainable development and improvement of quality of life; development of ecological culture in the context of becoming a model of society in a state of sustainable development in the joints of the system of continuous biology education.

4. Implement a synergetic approach to the management of learning: to organize the management of the learning process on the basis of providing all participants with operational information about the progress of education and unconditional compliance with the requirements of physiological,

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psychological and biosocial laws underlying human behavior.

J. Tolipova puts forward the following requirements for educational programs [6]:

- flexibility to adjust to a particular learning process;

- Ability to work with control programs or create (modify) control blocks;

- the ability to update the content, including through the means of communication (for example, the Internet);

- completeness of multimedia application;

- Proportionality (plasticity) (the presence of a teacher-expert unit at the core of the program to assess the success of each student);

- Database of each student's educational path;

- transparency (possibility of fragmentary use);

- usability (simplicity of use, no requirements for special knowledge of the teacher).

According to some authors [8], in order to solve the problem of quality of education, to carry out general didactic tasks, it is necessary to choose computer-assisted learning technologies that allow:

1. Integrate team communication and collaboration with individualized learning.

2. Facilitate the involvement of students in the solution of the problem of innovative changes in the system of general biological education, expanding the communicative-spiritual field of the educational process.

3. To provide each teacher with the opportunity to become an author, and at the same time to combine it with the acquisition of pedagogical skills in the theory of designing an information methodical system of teaching and the acquisition of design skills and practical knowledge.

These authors also identified specific principles for creating integrated teaching environments for software education:

1. It is advisable to fill the teacher environment with content that is consistent with the learning objectives set in the subject area.

2. When choosing the content of training, it is advisable to take into account the effectiveness of its computer support.

3. In the teaching environment, a model of the subject area or event should be presented in such a way that it not only adequately reflects it, but also most clearly reveals the structural elements, features, connections and relationships of the research object that are important for the stated learning objectives.

4. The content of the software learning environment should be complete, and the selected model should reflect the object or event as a whole.

5. In order to fully study an object or event as a system, it is necessary to provide a tool, tools that allow to perform operations (works) with structural elements, symbols, connections and relationships, including options for modification and improvement of the model.

6. The content that complements the teacher environment should include both control material and issues material (adequate effort) to reinforce the knowledge, skills, and competencies acquired.

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7. It is advisable to include reference components to the structure of the teacher system, textual explanations on the issues of working with the teacher environment and on issues of the subject area not intended for study.

8. Methods of monitoring and assessing the level of knowledge, skills and competencies acquired in the teacher environment, as well as the possibility of statistical development and visual representation of control results should be considered.

One of the most modern textbooks on new pedagogical and information technologies [8] shows the following possible models of information teaching aids:

- computer slide film model;

- encyclopedia model;

- virtual worlds (VD) model.

The creation of computer slideshows requires adherence to a number of principles:

- The dynamics of the presentation of the text is given by the teacher (this process can have options-networks);

- Meeting appeals are allowed;

- The logic of the text is given by the teacher (this process can have options-networks);

- computer slide film is designed for holistic viewing;

- Computer slide film forces the student to accept his logic on the study of the material;

- Computer slide film determines the rhythm of the material and has special audiovisual control of the perception of the material;

- The program allows the user to create computer slideshows.

The encyclopedia model includes the following principles:

- free movement in the text;

- brief (abstract) statement of information;

- It is not necessary to read the text as a whole;

- the information is in the description of the reference;

- use of meeting appeals.

The model of virtual worlds, according to the authors, can be considered as a further improvement of the model of computer slideshows, the expansion of its virtual and didactic capabilities and the introduction of a number of hypertext-specific principles, such as:

- Free movement on VD;

Some educators point to a problem with the following condition. Ready-made software tools in the classroom, often based on the real learning process, “may not be satisfactory for all educators and all student audiences. According to the authors, it is impossible to create a ready-made SP (software product). On this basis, these authors place the following requirement on a software product: it cannot be a finished software product; The need for subject-oriented environments (SOE) that meet the following requirements for computer support of teaching in various disciplines:

- allowing the user to make free efforts and ensure the diversity and flexibility of the material, content; support teacher and student initiatives;

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- SOE should consist of objects sorted in different ways: different types of models, problems, simulators, tests, videos, teacher scenarios, information and methodological components;

- SOE should be placed in an instrumental environment-shell, by means of which the teacher should be able to combine elements.

Psychological-pedagogical, didactic and methodological requirements to software pedagogical tools should be based on the following principles:

- scientific principle;

- The principle of exhibition;

- The principle of conformity to the didactic purpose;

- The principle of completeness, structure and coherence;

- The principle of stratification of education;

- The principle of continuity and modification;

- The principle of integration and stratification of knowledge;

- principle of technology;

- The principle of independent activity;

- The principle of cognitive communication;

- The principle of pedagogical ethics;

- The principle of symmetry of communication.

While discussing the principles of programmed learning, a number of authors have shown that they can also be applied to computer-based learning:

- Divide the material into small, interconnected and equal parts, portions, steps;

- activation of students' ability to analyze the activities, some steps of the programmed text;

- continuous assessment of each student's answer;

- Reflection - students' self-awareness of their own efforts, self-assessment;

- Empirical verification of programmed texts.

The work of a number of researchers is devoted to the identification and creation of principles of programmed and multimedia teaching. [9-10] They have been systematized and analyzed in detail by the authors in the following sequence:

1) rational sequence of educational operations;

2) individualization;

3) sharing;

4) immediate feedback;

5) activation of educational activities;

6) algorithmization;

7) rational distribution of study time;

8) change of information environment;

9) virtualization.

A number of researchers [11] pay special attention to the psychological-pedagogical and methodological principles and requirements for the organization of the screen interface. In particular, the following parts of the interface are distinguished:

- its location in the display of information;

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- organization of "student-computer" dialogue;

- organization of information entry into the computer;

- organization of student response analysis and system response.

A number of authors have identified the following principles for creating screen designs:

I. The principle of proportionality - determines the size of objects and their location in space; the different objects should be grouped and separated from each other, rather than randomly placed on the screen. The number of zones should not exceed 5-7, and for students of junior vocational colleges - no more than 3. Zones that are connected in meaning but separated from each other should be seated in the same way.

II. Order (placement of objects on the screen to organize the movement of the eyes). It is advisable to make the following developed recommendations here:

- Place texts for quick reading in the upper left corner, occupy a quarter of the screen and align on the right and left edges;

- it is better to place graphic information on the right side of the screen;

- It is desirable to develop and apply permanent colors, fonts and layouts for different types of messages and objects.

III. Accent is the separation of the most important object that should be considered first. The following accentuation tools are available:

- Place important messages in the center of the screen;

- separate important information from the rest of the information with a blank space;

- bright color, use in large font;

- emphasis added;

- use colored windows with a background.

IV. The principle of balance - shows the uniform distribution of the optical weight of the image object across the screen. The most important recommendations here are:

- information should not be collected in one half of the screen;

- the general title should be centered relative to the vertical axis of the screen;

- any chromatic color is perceived much heavier than achromatic) black and white);

- irregularly shaped objects are perceived much heavier than regular shaped objects;

- large objects on the screen are perceived more heavily than small objects;

- Lines and objects on a black background appear closer to the border, and black lines and objects on a bright background appear farther away.

V. The principle of unity requires that the elements of the image look as if they are interconnected, that they are properly matched in size, shape, and color.

The organization of the dialogue between the student and the computer is also an extremely important component of the interface. Scientific publications on this subject describe the following limitations in the description of communication in relation to the characteristics of the computer as a technical system:

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- vocabulary development, syntax, standardization of speech information;

- communication takes place within a limited lexical reserve, usually free of two different semantic and spiritual subtleties;

- limited content of the subject of the dialogue;

- lack of expressive means of dialogue between people;

- the language structure of the message plays a key role.

The following principles are defined for the dialogue between the student and the computer:

1) pedagogical orientation of the dialogue;

2) dialogue should promote the development of student thinking;

3) pedagogical etiquette;

4) diversity of means of communication;

5) the problem of literacy;

6) symmetry of communication.

A special situation arises in the context of the effective use of traditional teaching aids and new information technology tools. Here it is necessary not only to take into account the principles developed for both the conditions of the traditional learning process and for computer-based learning, but also to develop principles for two completely different didactic environments: traditional virtual environments.

The following principles are proposed by us for the integrated use of traditional teaching aids and new information technology tools.

Result and discussion

The principle of rational management of educational activities is the selection of material content on the one hand, using traditional means, on the other hand, using didactic and methodological basis. Here, it is also important to determine the sequence of use of this or that tool, taking into account the principles of teaching and the requirements for the training equipment. This principle summarizes many of the principles described below. The definition of this principle is quite general and can be applied to the planning and description of any learning process, but as we discuss, a carefully planned, optimal combination of teaching aids that helps reduce time and other costs is important. Of course, the discussion of the interaction of two different didactic groups of teaching aids should be done within the framework of a systematic approach, taking into account intra-system and inter-system connections. While the set of teaching aids has a certain degree of integrity, the biology of professional colleges has a certain structure that is inextricably linked with the structure of the curriculum content.

In implementing the principle of duplication of information, it is important to determine which information can be provided (needed) using only one system of teaching aids, and which information can be provided using both traditional and computer tools.

In the implementation of this principle, it is very important to take into account the characteristics of human perception of different forms of information and their combinations, the age characteristics of students. The interconnection of different types of information is inextricably linked with the acceleration of learning. As V.A. Smironov [7] points out, “the problem of acceleration has a completely different meaning, for example, the choice of such types of

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information that their simultaneous assimilation does not hinder the assimilation of each of them, but helps as much as possible. In this case, the process of assimilation of different types of information sets is characterized by the simultaneous optimization of the assimilation of each of the types that make up this set. The principle of duplication of information is inextricably linked with the principle of substitution of stimuli described below.

The principle of conformity of a virtual object to a concrete object should be expressed in terms of how well the image on the screen corresponds to the natural object. It is known that there is a big difference between the perception of real and virtual objects, which has been repeatedly mentioned in the psychological-pedagogical and methodological literature. The task of the developer of the software product is to bring the object described in this case as close as possible to the concrete object using multimedia tools. On the other hand, computer tools offer us many opportunities to model abstract objects and situations. In the development of methods of using computer-based teaching aids in biology and related software, it is necessary to determine in which cases and to what extent the virtual image should be modeled on real and asbestos objects and situations.

The principle of switching motors. If the information coming to one of the analyzers or a group of analyzers is repeated with the information coming to other analyzers, the training material can be assimilated most effectively. In particular, motor activity and tactile senses are extremely important for students in grades 5-9 in their knowledge of the world around them, and in this regard there is a need to strengthen computer-generated audio, graphic, and textual information blocks with volumetric manuals, especially natural visual aids. For college and academic lyceum students, theoretical information is more important, which means that the content and structure of the information provided to the student will be different, and the proportion of teaching aids may be different.

The principle of optimal loading of the student is logically derived from the previous principle. Because the computer tools used in the learning process can accelerate the process of acquiring, controlling, and consolidating knowledge, the timing of working with a particular block of information may also change, or the amount of material studied may change over time. Taking this aspect into account will allow you to optimize the study load, or discuss an issue in depth in a vocational college program, or spend more time learning new material. The application of this principle is associated with the implementation of two very important didactic principles - the improvement of teaching and individualization.

The principle of content dominance. The didactic (especially visual) capabilities of one or another teaching tool should not mask the information, nor should it overshadow the biological material. The logic of using the learning equipment should be consistent with the logic of the learning content and should not distract from the material being studied. On the other hand, in some learning situations, the situation may be different: a new high-tech teaching tool not only helps to develop self-interest, but also encourages the student to be interested and active in biological material. It is necessary to take into account these aspects in the planning of the educational process and create a system of teaching aids for a certain stage of the educational process, giving priority to knowledge, skills and abilities in the subject.

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The essence of the principle of a single source of information is the use of different teaching aids in such a way that the educational information coming through these teaching aids becomes a single stream to the student, rather than several streams at once. This is necessary for maximum focus on a particular learning material, as it is difficult to assimilate information while working with a textbook at the same time and, for example, watching a training video fragment and often shifting focus from one learning tool to another, resulting in logic of presentation but sometimes it is not possible. Simultaneous work with computers and traditional natural (natural) visual materials in relation to the combined use of traditional and computer-based teaching aids (except for the use of some types of educational activities with natural objects), for example, identification of plant or animal species using electronic detectors or textbooks simultaneous work is problematic enough for the above reason and also for major and minor difficulties (e.g. placing natural handouts, textbooks, teaching aids, etc. on a small computer desk in addition to the computer and the devices connected to it).

The principle of complementarity and non-contradiction states that the educational information provided to students by the same means should not contradict the information coming from other means, where computer images and images of natural objects and events are described more than evidence-based inconsistencies (although this is often observed in the learning process) (by the way, even traditional visual aids) is about adequacy and comprehensibility.

The principle of division and replenishment of didactic possibilities is that the rational and simultaneous effective use of different gender teaching aids is possible only under the conditions of clear limits and consideration of didactic possibilities provided by these means.

The principle of rational step-by-step learning information. As mentioned above, the technology of integrated use of teaching aids is based on the separation of material into individual components - steps and the identification of direct teaching methods and tools for them, as shown in the work of a number of researchers.

In our view, this can be distinguished as a separate principle. The existing differences between these two groups of tools (not only didactic but also purely organizational) in the effective use of traditional and computer-based teaching aids in lesson planning: how the transition from one learning device to another occurs or how to work with two or more tools must be kept in mind. Of particular importance is the exchange of teaching aids that provide information in different forms and for different analyzers.

CONCLUSION

1. Thus, the computerization of teaching the course of biology teaching methods is considered as the most modern trend in the development of didactics and concrete methods.
2. Regardless of the level of computer equipment of the audience, the central role is played by the professor-teacher, who regulates the interaction of "student-computer" in the context of general computer literacy, mastering the methodology and methodology of the educational process.
3. Mastering the methodology, principles and methodology of computer training should be one of the central requirements of the biography teacher's professional profile and an invariant of the qualification description.

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4. The use of computer technology in the classroom and extracurricular activities should be comprehensive, and at the same time differentiate between different means of computers and their combination of other means of teaching, depending on the goals and content of the lesson (lesson) and its stages. should be increased.
5. The formation of the algorithmic culture of students should be carried out in the process of conducting laboratory classes and workshops, starting with the use of algorithmic forms of abstract writing in each lesson, both in machine learning and non-machine learning.
6. Since the computer is in fact a component of the whole set of technical means of teaching, the basic didactic requirements for the integrated use of modern means of teaching and education apply to the links of continuous biology education.
7. Due to the fact that computer-based learning is in fact an analogue of programmed learning and provides a wide range of capabilities and high quality of flexibility, the general principles of programmed learning also apply to computer-based learning.

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