

PECULIARITIES OF USING MODERN EDUCATIONAL TOOLS TO INCREASE THE EFFECTIVENESS OF TEACHING THE NATURAL SCIENCES AND DIRECT STUDENTS TO INDEPENDENT ACTIVITIES

Karakhonova Lobarkhon Musakhonovna*

*Associate Professor,
PhD,

Head of the Department of "Technology of Teaching Natural Sciences",
Uzbek Research Institute of Pedagogical Sciences named after T.N.Qari Niyazi,
Email id: liya2305@mail.ru

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ABSTRACT

Effective work is being carried out in the world to create an informatized educational environment in the system of continuous education, to widely introduce modern information technologies, to create a base of educational resources and ensure the effectiveness of their use, to achieve deep and lasting assimilation of academic subjects. For example, in the study of biology, electronic educational resources, modern digital electronic devices, interactive program schemes, as well as the embodiment of biological concepts into knowledge in the process of mastering the subject of biology, the skills of independent research formed with the help of electronic educational resources, are of great importance.

KEYWORDS: *Creating An Informatized Educational Environment, Correlating The Control Of Students' Knowledge Acquired During The Lesson And In Extracurricular Activities With The Requirements Of International Education Quality Assessment Programs Designed For Virtual Observations And Biological Experiments.*

INTRODUCTION

Relevance and Relevance of the Dissertation tTpic

The world community carries out scientific research aimed at developing opportunities for further improvement of the learning process and the effective use of electronic educational resources in the system of studying modern biology based on the development of interactive educational strategies and mechanisms in the field of biology in the context of adaptation to the trends of sustainable development of the educational system. These studies serve to enrich biological science with new promising areas and are important for solving pedagogical and psychological problems of their integration with the informatized educational environment of existing educational processes.

In our country, the creation of an informatized educational environment, the widespread introduction of multimedia applications in academic subjects, the creation of a new generation of educational and methodological literature and the improvement of textbooks based on an innovative approach are considered the most urgent tasks of today. In the Concept for the

Development of the Public Education System of the Republic of Uzbekistan until 2030, the priority tasks are "the development of multimedia products in education and the organization of their systematic use in the educational process." In turn, interactive electronic educational resources will contribute to the development of biological knowledge and the potential of students in general education secondary schools, the improvement of basic and subject competencies of students by means of electronic educational resources in the classroom and extracurricular activities.

This dissertation research, to a certain extent, serves to implement the tasks outlined in the Decree of the President of the Republic of Uzbekistan PF-4947 dated February 7, 2017 "On the Action Strategy for the Further Development of the Republic of Uzbekistan", the decree of the President PF-5099 dated June 30, 2017 "On measures for the fundamental improving the conditions for the development of information technology in the country", Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 997 dated December 8, 2018 "On measures to organize international research in the field of assessing the quality of education in the public education system", Decree of the President PF-5712 dated April 29 2019 "On approval of the concept of development of the public education system until 2030", as well as in other legal documents.

Compliance of the study with the priority areas of development of science and technology of the republic. The dissertation research was carried out in accordance with the priority direction of the development of science and technology of the republic I. "Spiritual, moral and cultural development of a democratic and legal society, the formation of an innovative economy."

The degree of knowledge of the problem. In our republic, the problems of informatization of the education system, the possibility of introducing electronic and distance learning were studied by scientists M. Aripov, A. Abdukadirov, U. Sh. Begimkulov, R. Kh. M. Tsoi. In the studies of A.T.Gofurov, Zh.O.Tolipova, O.M.Mavlonov, S.S. Fayzullaev, G.S. Ergashev, Z. Matyakubova, S. issues of improving the methods of teaching biology, organizing extracurricular and extracurricular classes in biology, the use of modern educational technologies in teaching biology, the possibility of using electronic educational resources in the educational process.

Scientists of the Commonwealth of Independent States V.I. Evdokimov, Ko Yong Chol, G.P. Chepurensko, P. Apatova, E.I. Mashbits, Yu. Astratov, E. V. Buryachenko, L. I. Bulaventsova, I. A. Vasilyeva, V.V. Kirilenko, G.V. Ivshina, E.G. Kobernik, A.G. Kritsky, A.V. Umanets N.V. Musinova, O.G. Petrova, E.A. Filippov, V. Staradubtsev, V. Smirnov, S. Sumatokhin, Yu. A. Tikhomirova studied the issues of using information technologies and educational resources in teaching biology.

In foreign countries L. Rageda, T. Weert, L.M. Semali, A. Bork, Casotti G, Rieser-Danner L, Knabb MT, M. C. Linn, J. A. Chiu, P. Mary A. Fernandez, S. Ribarič, M. Kordaš, S.W.Rissing, J.G.Cogan investigated the use of information technologies in the process of teaching biology, computer modeling, the introduction of e-learning, the development of advanced pedagogical and information technologies, and developed virtual laboratory classes.

The purpose of the study is to improve the methodology for using electronic educational resources in teaching biology.

RESEARCH OBJECTIVES:

Determination of the effectiveness of the use of modern informatized educational environment in the development of the structure of basic and subject competencies in biology in 7th grade;

Improvement of educational technologies for the development of biological knowledge, skills and abilities of students about the world of animals in biology lessons based on the systematization of an interconnected set of educational technologies and programmed learning tools;

Organization of extracurricular work in biology, aimed at the independent activity of students, providing individual acquisition of knowledge using electronic software;

Correlating the control of students' knowledge acquired during the lesson and in extracurricular activities with the requirements of international programs for assessing the quality of education.

RESEARCH METHODS

Comparative study and analysis of psychological and pedagogical literature and electronic educational resources on the topic of research, socio-pedagogical methods (observation, conversation, diagnostics, questionnaires, testing), mathematical and statistical methods for processing the results of the experiment.

The Scientific Novelty of the Research is as Follows:

Directions for improving the methodology for using electronic resources through the integration of a modern informatized educational environment in teaching biology based on a systematic approach are determined;

The structure of basic competencies of students in biology (work with information, self-development, and communication skills) and subject competencies based on the requirements for the level of natural science literacy (perception, understanding, implementation in practice) have been improved;

Developed a methodological system for developing students' research skills (choosing a topic, observing and conducting an experiment, research, conclusions) based on electronic software tools used for self-education of students in extracurricular biology classes (multimedia applications, essay topics, "Entertaining Zoology", "Red Book");

The system for monitoring and evaluating students' knowledge in biology lessons has been improved based on the development of non-standard off-line tests.

The Practical Results of the Study are as Follows:

The practical didactic system of using electronic educational resources in biology for the 7th grade of general secondary schools has been improved;

Developed multimedia applications, presentations, video and audio tools in biology for grade 7, programmed test items to control students' knowledge in accordance with the State Educational Standards were considered at the methodological council of the Republican Education Center and recommended for use in secondary schools of the republic;

Developed a methodology for improving the use of electronic educational resources in biology for grade 7 based on a student-centered approach.

The Reliability of the Research Results is Determined by the Use of Methods and theoretical approaches from official sources in the work, the analysis carried out on the basis of empirical study, the validity of the effectiveness of experimental work by processing the results using mathematical statistics methods, the implementation of the conclusions and recommendations of the study into practice, confirmation of the results obtained by competent organizations.

Scientific and Practical Significance of the Research Results

The scientific significance of the research results is determined by the disclosure of the content of improving the use of electronic educational resources in teaching biology, the development of means for organizing the educational process in biology using electronic means, the definition of methodological conditions for students to master the competence of obtaining information based on a competency-based approach, improving the theoretical foundations of the methodological system aimed at improving effectiveness of teaching biology by means of information resources.

The practical significance of the results of the study is to determine the methodological possibilities for improving the use of electronic educational resources in teaching biology, in developing interactive models that highlight the qualitative and quantitative characteristics of biological objects and signs-symbols (process, phenomenon and graphic representation of biological functions), in creating software tools, designed for virtual observations and biological experiments, in the development of guidelines for the organization of work in the classroom and extracurricular activities, and the use of tasks in virtual laboratories and non-standard tests for 7th grade students.

Implementation of the Research Results

Based on the results obtained to improve the methodology for using electronic educational resources in teaching biology:

Proposals on the didactic possibilities of using electronic educational resources through their integration into a modern informatized educational environment in teaching biology based on a systematic approach were reflected in the implementation and in the scientific results of the applied project PZ-2014-0910154408 on the topic "Creation and implementation of an information and communication environment in general education secondary schools" (2015-2017). (Reference No. 89-03-4521 dated November 25, 2019 of the Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan). These recommendations will serve to increase the possibilities of using electronic educational resources in teaching biology, the development of students' knowledge about the animal world;

Proposals for the formation of basic and special competencies in students in the subject of biology, increasing the level of natural science knowledge based on the use of a set of programmed learning tools were used to obtain scientific results in the implementation of the applied project A1-XT-1-89215 "Implementation of an interactive methodology and educational equipment in the practice of school education in order to improve the effectiveness of control and management of the quality of education" (2012-2014). (Reference No. 89-03-4521 dated November 25, 2019 of the Ministry of Higher and Secondary Specialized Education of the

Republic of Uzbekistan). On the basis of the scientific results of the dissertation, the possibility of using electronic educational resources for the development of students' knowledge of biology, in particular, knowledge of the measure of animals, was created.

Proposals for the development of electronic software tools aimed at self-education and the development of research skills of students in the process of extracurricular work in biology, and a system of test tasks adapted to the control mode of students' knowledge in the classroom and extracurricular activities, were used in the preparation of the order of the Ministry of Public Education of the Republic of Uzbekistan No. 6 of January 6, 2018 "On the organization of basic schools for exact, natural, humanitarian applications." (Certificate of the Republican Education Center No. 01/11-01/01-2315 dated October 11, 2019). As a result, an opportunity was created to improve the competencies of independent work of students in the process of classroom and extracurricular activities.

Administered

The introduction substantiates the relevance and relevance of the study, defines the purpose and objectives, the object and subject of the study, and shows its compliance with the most important directions in the development of science and technology. Information about the scientific novelty, practical results, and reliability of the results, theoretical and practical significance, and implementation of the results into practice, published works and the structure of the dissertation are given.

Modern approaches to the learning process, the fundamental reform that is being carried out today in the teaching of all academic subjects, are inextricably linked with the use of modern innovations and interactive tools in the educational process, the professional competence of teachers, and the intellectual potential of students.

The Decree of the President of the Republic of Uzbekistan "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan" outlines important tasks for the development of education and science, a significant improvement in the quality of general secondary education, in-depth study of foreign languages, computer science and mathematics, physics, chemistry and biology at a high level.

Based on the goals and objectives of teaching biology in secondary general education institutions, it is required to create a modern informatized educational environment that provides for the targeted use, along with educational and methodological complexes, of electronic resources aimed at developing basic and subject competencies in biology for young students, developing skills in using information technologies and information handling skills.

The teaching of academic subjects in all institutions of the system of continuing education, in particular biology, is due to the fact that throughout the study of biology, preparation of materials for presentation on each topic is carried out, and the most appropriate means are used in the educational process.

General requirements for the development of new generation educational and methodological complexes in general subjects are reflected in the State Educational Standards for General Secondary and Secondary Specialized Vocational Education: "Multimedia applications for textbooks include video, audio sources, animation, tables, texts and dictionaries, covering

materials on academic subjects using information and communication technologies in accordance with state educational standards and curricula, contributing to the effective assimilation of the content of academic disciplines and the development of self-education skills, helping to control knowledge and consolidate it, enriching the main content of the academic subject ". The foregoing emphasizes the need to use electronic educational resources in all general education subjects.

Visual aids that serve to increase the effectiveness of teaching scientific disciplines are created on the basis of specific practical programs. Teachers are required to prepare such software tools and possess the competencies for their implementation, and in this matter there is a need to involve programmers directly. In many cases, electronic tools are created that combine scientific sources on an integration basis in two scientific disciplines. If each student is able to independently use a computer, then the opportunities to introduce him to the world of inventions and research expand. Modern education is mainly based on teaching programs, visual representation techniques, computational operations using a computer and mobile devices. In any study, it is impossible to do without electronic educational resources. Electronic means and technologies for their use, therefore, an informatized learning environment is considered as an effective scientific and practical tool.

The use of high-quality electronic means and the correct connection to the educational process create optimal conditions for students to accept the necessary information, process it, master basic and subject competencies, control them, develop creative abilities, introduce additions and changes to the educational process, and continuously check the results of education. In addition, opportunities are being created for diagnosing and predicting the activities of students, developing recommendations for designing future lessons, determining the order of educational and cognitive activities of students aimed at consolidating certain information.

This chapter reflects the issues of using electronic educational resources in biology lessons, existing electronic educational tools in secondary schools, organizing the activities of a biology teacher in an informatized educational environment, problems of computerization of the science of biology, information obtained through answers to the questions of the questionnaire, conclusions on their analysis. .

This article reveals the methodological essence of the introduction of electronic educational resources in biology lessons, the importance of the didactic model and didactic systems to improve the effectiveness of biology lessons.

Efficiency in biology lessons in most cases is achieved through compliance with didactic patterns and purposeful introduction of evidence-based forms, methods and techniques into the educational process. Acquaintance of students with the world of animals, their way of life, reproduction and development occurs through the receipt of scientific information from the textbook and teaching aids. The activation of the educational process is implemented on the basis of innovative approaches in the education system, through the use of modern technologies and programmed teaching aids, tests and other non-traditional teaching aids. Electronic learning tools also contribute to increasing the activity of students in the study of many academic disciplines.

The use of electronic means in biology lessons is associated with new methods of their implementation. The use of electronic educational resources in biology is associated with the fulfillment of certain conditions:

Clarity and variety of information presented (color illustrations, audio-video recordings, animation and other types);

Implementation of feedback (a system of tests to determine the degree of assimilation, providing quick control);

Training in self-control skills for the purpose of active and accelerated assimilation of educational materials;

Constant "maintenance" of teaching aids and enrichment of new information, that is, the purpose of electronic teaching aids is to synthesize the main educational material with additional new information with the prospect of its possible use in the future.

The use of electronic educational resources in teaching biology also provides a solution to educational problems.

With the help of electronic educational resources, the efficiency of mastering educational material in biology, the development and consolidation of vital skills and abilities is achieved:

- 1) The visibility and accessibility of the presentation of the most difficult topics and concepts is ensured, for example, familiarization with the external and internal processes occurring in the body of animals, it becomes possible to visually observe and track them (through a monitor);
- 2) Specific methods of studying the structure and location of organs in animal organisms are organized;
- 3) The use of CD and DVD set-top boxes showing short popular science films directly related to the labor and habitat of animals helps to form students' understanding of the lifestyle of animals, their distribution area, animal species, interaction and relationship with nature;
- 4) The integration of electronic resources into the educational process contributes to the development of skills for self-acquisition of knowledge.

The level of development of knowledge and skills of students within the framework of the topic under study depends on how the quality and quantity of visual aids meet the requirements of the tasks of teaching biology at a particular stage. Thanks to electronic resources, it is possible to present a color image of animals, their external and internal structure, functioning systems, a variety of animal species, and more.

Prepared electronic educational resources were introduced into the educational process in biology in 7 grades of secondary schools. Particular attention was paid to the choice of topics in accordance with the SES, the program and the textbook, the use of resources was carried out taking into account the competence-based approach and focusing on international standards when assessing the quality of education.

When choosing the elements of the technology used in teaching, it is necessary to take into account the nature and direction of the educational and cognitive activity of students. Practice shows that, as a rule, 7-8 minutes of the lesson is given to the theoretical part, followed by

discussion, work in small groups, organized in order to consolidate knowledge. In the first 7-8 minutes, the highest efficiency of assimilation is observed, then the motivation for learning weakens (over the next 15 minutes). There is a need to keep the attention of students as long as possible. It was noted above that the reasonable quality and quantity of the visualization involved will help maintain the attention and cognitive activity of students at the level necessary for effective assimilation. These can be drawings of animals in color, diagrams, their external and internal structures, images of functioning systems, habitats and other visual materials.

Large sections of zoology were selected for the study: Protozoa, Mollusks, Worms, Amphibians, Reptiles, Mammals (by class) and electronic resources prepared in the form of animation with a dynamic effect in the Makromedia Flash program.

The main difference between this program and the main ones is that it includes a set of materials in a multimedia format on all topics of the section - on morphological and physiological processes in the animal body, presented in a series of animations, videos, drawings, infographic information.

For self-study in the educational resources posted the "Red Book" of Uzbekistan in the form of pdf. In biology lessons, additional material is interesting information about classes of animals or individual animals in the block for biology lessons in grade 7 "The World of Amazing Animals". These materials can be referred to when organizing extracurricular activities in biology. The resources include photos of excursions and videos.

It should be recognized that the created program aimed at increasing the effectiveness of biology lessons is not without some shortcomings. Along with the widespread introduction of technological elements into the modern educational process, it is necessary to remember about innovative methods for increasing the effectiveness of biological education.

As for extracurricular and extracurricular work in biology, its main content is the presentation of additional information about the morphological and anatomical structure of animals, the functioning of life support systems. Extracurricular theoretical knowledge and practical skills.

In the process of extracurricular work, it is advisable to organize short-term observations of the development of animals at different stages of their life. For example, the breeding season (by observing the fish in the aquarium, or the moment the egg is opened and the chicken or canary chick is "born", the development and growth of the kitten or puppy). Students using live examples can follow the behavior and development of animals in different periods, such observations will help to form in schoolchildren a sense of love for nature and a desire to protect and protect the animal and plant world.

Electronic educational resources of an innovative orientation, helping to enrich the theoretical knowledge and practical skills of 7th grade students, to form their research skills.

In order to prepare students for the international system of knowledge assessment in educational institutions of the secondary education system, one should focus on the parameters of the PISA, TIMSS systems, where it is proposed to use a set of computerized test tasks in several academic subjects. In this regard, it became necessary to develop a didactic system for the use of computerized non-standard tests in biology in the 7th grade for lessons, extracurricular and

extracurricular activities. We have prepared blocks of test tasks on 10 topics from the "Mammals" section.

FINDINGS:

1. The study summarizes the theoretical, scientific and methodological foundations of the pedagogical problem of using biology in teaching in secondary schools, substantiates its relevance.
2. The use of visual materials related to the content of biological education is important for improving the effectiveness of biology lessons, enhancing the educational and cognitive activity of students, and developing basic and special competencies.
3. Developed on the basis of the results of the study and introduced into the educational process in biology, the methodological system contributes to the assimilation of topics difficult for students, allows direct observation (using visual aids) of biological processes, and creates the opportunity to present educational material in a systematic form.
4. In the process of studying biology in grade 7 of general education schools using electronic educational resources, in the classroom and extracurricular activities, an increase in the level of knowledge and skills of students in biology, the formation of competencies for obtaining information was noted. The study developed recommendations on the use of electronic educational tools to improve the efficiency of extracurricular work in biology.
5. In extracurricular activities using electronic educational resources, students develop individual activity skills and group work skills when studying a new topic. In biology lessons in the 7th grade, the use of the methodological system ensures the quality of students' assimilation of theoretical materials, which is supported by the organization of virtual laboratory work.
6. The developed set of test tasks (of-line) for the control and self-assessment of students in teaching biology creates an opportunity to identify their knowledge and skills in the process of mastering topics.
7. In order to further improve the methods of teaching biology by means of the created electronic educational programs, an experiment was conducted in secondary schools, the results obtained were analyzed and summarized.
8. The results of the experiment convince us that the improvement of the system for the effective use of electronic educational resources in teaching biology and their widespread implementation contributes to the manifestation of independent activity of students and the successful assimilation of educational material in biology. The results of the experiment, statistically processed, confirm the relevance of this study.

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