

Improving The Effective Use Of Interactive Software For Biology Education

Ergasheva Gulruxsor Surxonidinovna¹, Rajabov Khudayor Madrimovich²
Atakulova Manzura Nematovna³

¹*Doctor of Pedagogical Sciences, Tashkent State Pedagogical University after Nizami, Tashkent, Uzbekistan,*

²*Doctor of Philosophy (PhD) on pedagogical Sciences, Urganch State University, Urgench, Uzbekistan.*

³*Senior teacher, Department of Biology Teaching Department, Navoi State Pedagogical Institute, Navoi, Uzbekistan.
E-mail: egulruxsor@mail.ru*

Abstract: *This article discusses ways to use interactive software in biology education. The types of interactive software used in teaching biology and the possibilities in preparing future biology teachers for professional activities are described. And also, it is devoted to the development of electronic teaching and methodological resources of educational institutions, improving mechanisms for the effective use of interactive software based on innovative approaches, methodological support for the organization of the educational process based on interactive software in the training system of future biology teachers, a system of professional competencies and mechanisms of cyclic diagnostics.*

Keywords: *Keywords: biology, interactive, software, improvement, biology teaching methods, innovation, electronic educational environment, resource, publication.*

1. INTRODUCTION

In the developed countries of the world, the intensive development of the information system and telecommunication technologies has a positive effect on improving the quality and efficiency of education, expanding the possibilities of using digital educational resources, interactive software. The introduction of innovative ideas in the field of education is the impetus for achieving high results in the field of protein engineering, studying DNA, mastering knowledge in the field of terrestrial and underwater resources in the fields of bioinformatics and biotechnology using interactive technologies, researching the biodiversity of plants and animals in ecosystems, modernizing the training system. biologists who are able to carry out activities in these areas.

In the context of adaptation of the world educational system to sustainable development trends, priority is given to the tasks of improving interactive educational strategies and mechanisms in the field of biology based on the principles of modern development, training creative specialists capable of designing their activities, divergent thinking in new areas of biology: biotechnology, molecular cloning, computer microscopy, retrospective monitoring, nanotechnology. This, in turn, is significantly focused on the psychological and pedagogical solution of the problems of

effective use of electronic educational resources, high-quality implementation of interactive educational services, integration of the pedagogical process and the educational environment with the processes of active exchange of information. In the strategy for the further development of the Republic of Uzbekistan [1], the priority task is to improve the quality and efficiency of the activities of higher educational institutions on the basis of the introduction of international training standards and assessment of the quality of teaching, in connection with which the improvement of technology, methodological support of the organization of the educational process on the basis of interactive software is of great importance. In the system of training future biology teachers, the system of professional competencies and mechanisms of cyclic diagnostics.

2. PROPOSED METHODOLOGY

Analysis of promising directions for the development of information technology indicates an increase in the role of electronic teaching aids in the educational process. The informatization of education has led to the emergence of a new direction of modern teaching aids, i.e. interactive technologies and interactive learning tools.

Interactivity (eng. Interaction - interaction, cooperation) - a concept that reveals the nature and degree of interaction between objects, is used mainly in the theory of informatics, the fields of informatics and programming, as well as telecommunications, sociology, industrial design and other systems.

Interaction - the principle of organizing systems pursues the achievement of information exchange between system elements.

Interaction is a kind of action that occurs as two or more objects have an effect upon one another. The idea of a two-way effect is essential in the concept of interaction, as opposed to a one-way causal effect. Closely related terms are interactivity and interconnectivity, of which the latter deals with the interactions of interactions within systems: combinations of many simple interactions can lead to surprising emergent phenomena. Interaction has different tailored meanings in various sciences. Changes can also involve interaction.

Casual examples of interaction outside science include:

Elements of interactivity are all elements of a system interacting with another system (human user).

Interactive teaching aids are software, hardware-software and technical means, equipment that provide dialogical activity of the user with a computer, operating on the basis of microprocessor and digital technology. A peculiar feature of interactive teaching tools is the introduction of students with educational material, and the performance of individual teacher functions. Feedback is aimed at correcting and replenishing knowledge by the student on the basis of automated diagnostics of errors made in the process of work with the use of advisory information by the student himself. In our opinion, interactivity provides an active exchange of information by students, their entry into communication with educational material using interactive software. As a result of the implementation of feedback on the basis of automated diagnostics, it serves to increase the efficiency of assimilation of educational material and the educational process [2].

The organizational aspect of the effective use of interactive software tools in the information and communication educational environment (Fig. 1) includes the technical (interactive)

equipment necessary in the process of teaching biology (electronic board, projector, phone, tablet, plasma panel, mobile replication devices, test systems, small information and communication facilities)[8].

The software consists of learning management systems in the electronic educational environment (MOOC, Moodle, V-academia), web services: prezi.com, plickers.com, zunal.com. These systems and programs allow you to design interactive presentations (prezi.com), interactive lectures, classes, create electronic training courses, textbooks (Moodle), form students' knowledge (especially when repeating or reinforcing the topics of the lectures passed, during operational group assessment, in current control) using modern technologies QR-code (plickers.com), virtual reality (V-academia). These programs do not require students to know a programming language or other special knowledge. Ready-made presentations or material can be easily created based on the instructions of the developer.

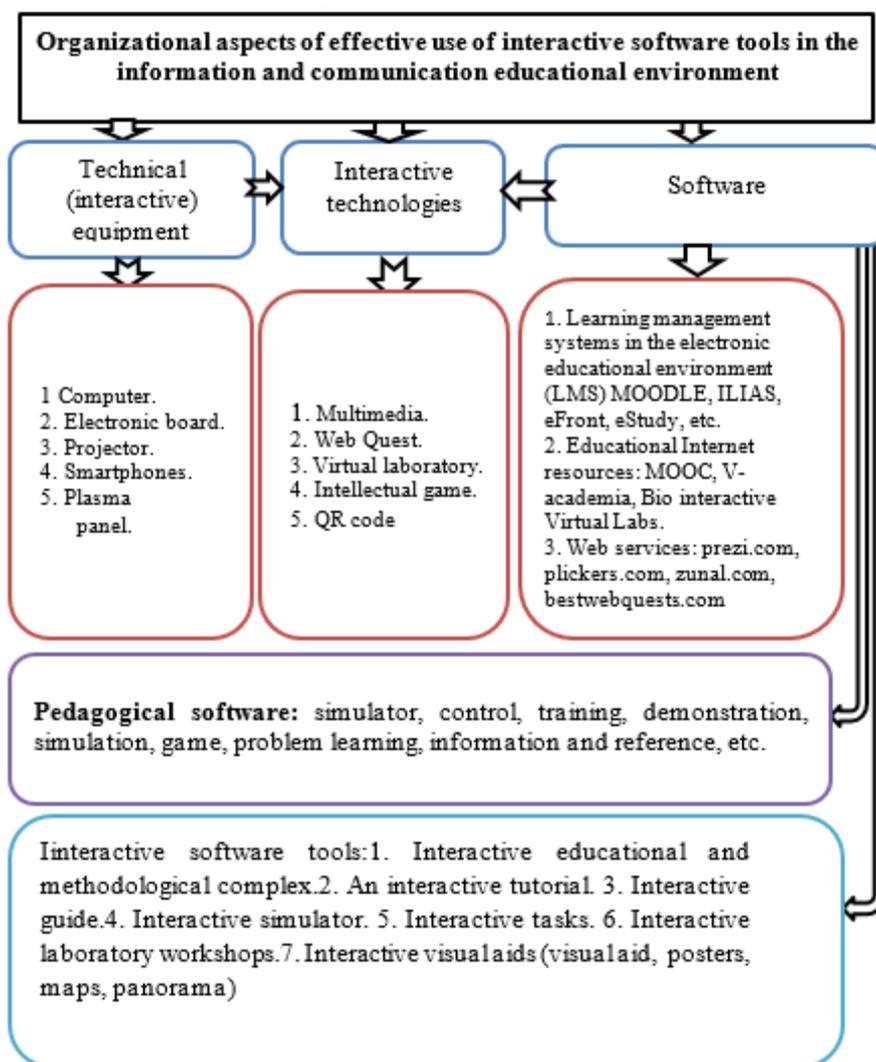


Figure: 1. Organizational aspects of effective use of interactive software in the information and communication educational environment

According to the results of the study, it was determined that today the interactive software tools used in biological education are: an interactive educational and methodological complex, a textbook, a reference book, a simulator, tasks, laboratory work, visual aids.

Our scientific research reveals the content of media education and the use of multimedia technologies, web-quest, intellectual games in teaching biology, the methodology for organizing virtual laboratories in biology and conducting classes with their use, a mechanism for using interactive software in biological education has been developed. The electronic resource of interactive software "Biology" has also been developed, the structure of which includes: interactive lectures, drawings, animations, multimedia products, virtual laboratories, crosswords, web quests, intellectual games, etc.

In the part of interactive lectures, the content of lectures of the working curriculum of the discipline on the choice of "Information and communication technologies in biology" is highlighted, their flow charts and presentations are given. To improve the effective use of interactive software in biological education, it is necessary to strengthen the methodological support, to replenish it with the necessary methodological material. For this purpose, the methodological support of interactive software tools used in teaching biology has been formed.

As a result of the research carried out, the mechanism for improving the effective use of interactive software in biological education was interpreted as follows (Fig. 2). To improve the effective use of interactive software in biological education, first of all, it is necessary to analyze its state in teaching practice and create, based on the conclusions of the organizational and didactic system of using interactive software in biological education, which will allow adaptation to the standards of the higher education system in developed countries, the conditions for obtaining distance and open on-line education. Organizational and didactic system was formed the topic through the technical equipment necessary for interactive education, software, learning management systems in the electronic educational environment (e-learning), Internet educational resources.

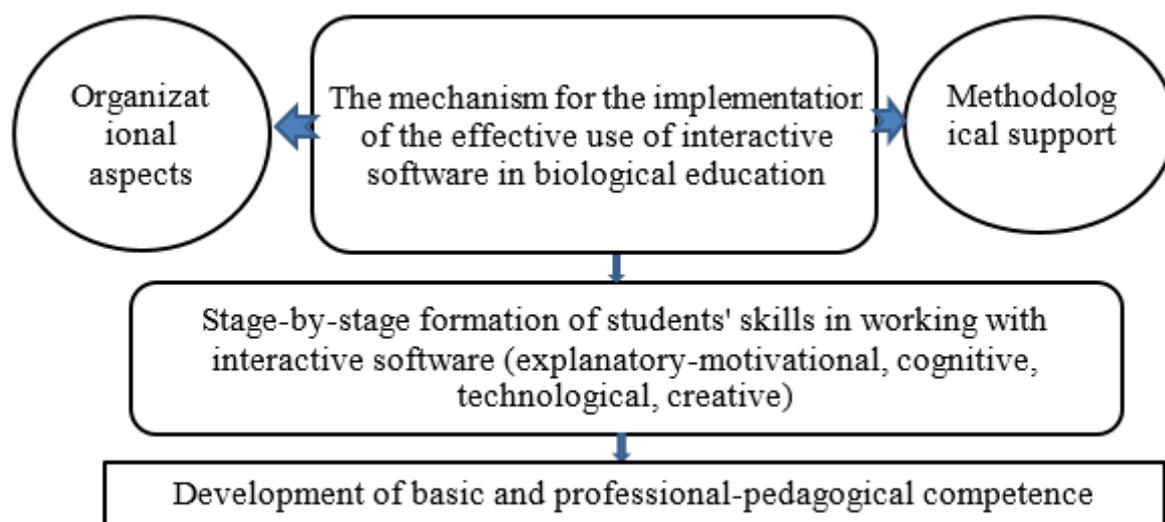


Figure: 2. The mechanism for improving the effective use of interactive software in biological education

3. RESULT AND ANALYSIS

On the basis of the course "Information and communication technologies in biology" (organizational and managerial, explanatory and motivational, cognitive, technological, creative) stages of the formation of skills in working with interactive software are

defined. Based on the formation of students' skills in working with interactive software tools, the formation of their key and professional competence has been achieved. Skills and abilities in the field of interactive software and their application in pedagogical higher educational institutions were formed in the process of studying the disciplines "Information and communication technologies in biology" and "Innovative technologies in teaching biology". The stages of the formation of students' skills in working with interactive software were developed (Table 2). In the process of developing students' skills in using interactive software in the practice of biological education and designing the development of classes with their use, various methods were used, special attention was paid to such methods as questioning, testing, interviews, conversations, experimental tests, system monitoring, statistical data processing.

Table 2. Stages of developing skills for working with interactive software

Organizational and managerial	Determination of initial (primary) knowledge, skills and abilities of students and orienting them to work with interactive software
Explanatory and motivational	Formation of students' knowledge about the available interactive software tools, their content, significance in the educational process, the formation of skills and abilities to work with them, adapting them to their use in educational practice (ICT course in biology, topics No. 1 and 3)
Cognitive	Arming students with the necessary didactic support for working with interactive software (exercises, drawings, diagrams, tests, presentation material, electronic textbooks, website addresses) (ICT course in biology, topics No. 3-5)
Technological	Expanding the ability of students to master the technologies of work and the use of interactive software in the educational process (design of interactive development of classes) (topics No. 6-16)
Creative	Development of skills and abilities of students to work with interactive software at a creative level. As a result of a creative search, students master the skills and abilities of designing interactive software tools. Mobilizing students for the effective use of interactive software in the educational process based on a creative approach (topics No. 11-16)

The research program was drawn up as a diagnosis of the general standing of the problem in the pedagogical process and tested with students in the direction of education Methods of teaching biology of the faculties of natural disciplines of TSPU named after Nizami, Kokand, Navoi state pedagogical institutes. The respondents were 2-4 year students of the listed educational institutions (a total of 526 respondents, of which 264 in the control group, 262 in the experimental group).

The skills and abilities of students in the field of application in biological education of various information technologies, preparation of presentations, the use of interactive software tools, design on this basis of the development of classes were analyzed on the basis of the following criteria:

motivational - defining the concepts of students about the possibilities of using information technologies, computers in biological education, interactive presentation materials;

cognitive - assessment of concepts and ability to apply web-quest presentations, animation, multimedia, electronic textbooks, Internet materials in educational practice;

technological - expanding students' opportunities for mastering and applying in educational practice technologies for working with interactive software tools, determining the level of proficiency in the skills and abilities of designing lessons development using interactive software tools;

creative - assessment of students' skills and abilities to use interactive software at a creative level.

As part of the research, an analysis of the readiness indicators of the students of the experimental and control groups for the use of interactive software in biological education was carried out according to the results of the ascertaining, forming and final stages (Table 3).

Table 3. Analysis of student performance based on certain criteria at the stages of the experiment

Experiment types	criteria	Experimental group number of students = 262			Control group number of students = 264			коэффициент эффективности
		X*	\bar{s}	confidence interval	X*	\bar{s}	confidence interval	
ascertaining	motivational	67,88	20,34	[65,41;70,34]	67,76	20,43	[65,30;70,23]	1,00
	cognitive	59,12	24,63	[56,14;62,10]	59,65	24,48	[56,69;62,60]	0,99
	technological	38,68	21,43	[36,08;41,27]	40,3	22,41	[37,63;43,03]	0,96
	creative	37,12	20,34	[34,66;39,59]	34,73	18,29	[32,52;36,93]	1,07
formative	motivational	73,33	14,71	[71,55;75,11]	70,27	18,29	[68,07;72,48]	1,04
	cognitive	68,85	19,57	[66,48;71,22]	59,65	24,48	[56,69;62,60]	1,15
	technological	54,06	25,45	[50,98;57,14]	42,26	23,35	[39,44;45,08]	1,28
	creative	38,68	21,43	[36,08;41,27]	35,11	18,65	[32,86;37,36]	1,10
final	motivational	78,00	0	[78,00;78,00]	78	0	[78,00;78,00]	1
	cognitive	74,50	12,90	[72,93;76,06]	63,70	22,91	[60,94;66,47]	1,17
	technological	68,27	20,04	[65,84;70,69]	49,41	25,31	[46,36;52,46]	1,38
	creative	49,39	25,31	[46,32;52,45]	38,20	21,12	[35,66;40,75]	1,29

These results were processed using one of the methods of mathematical statistics - Fisher's test. The results of the analysis of the data obtained on the basis of the Fisher criterion showed noticeable changes in the indicators of technological and creative criteria among students of the experimental group. Observations carried out in the control groups indicate the growth of

technological and creative criteria for the level of skills in using interactive software tools and designing with their use of lesson development is not so noticeable.

In the experiments carried out at the subsequent stages, a difference was observed between the intervals of reliability and the indicators of the effectiveness of the obtained mean states. If the indicators of the motivational criterion did not change at each stage, then the indicators of cognitive, technological and creative criteria at the formative and final stages, the effectiveness increased, respectively: cognitive from 1.15 to 1.17, technological from 1.28 to 1.38 and creative criteria from 1.10 to 1.29 times.

Thus, we can conclude that the use of interactive software in biological education is a practical basis for preparing future biology teachers for pedagogical activities.

4. CONCLUSION

As a result of the study, the following conclusions were made:

1. In the process of teaching the direction "Methods of biological education", the system of preparation for professional activity has been improved on the basis of modern development trends, improving the effective use of information and communication technologies, interactive software.

2. The composition and capabilities of the components of the educational environment in the context of information and communication technologies have been expanded: the components of the active exchange of information in the electronic environment, orientation towards project activities and the use of interactive software of the structure of key and professional-industry (motivational-value, cognitive-activity, personal -reflexive) competencies of future biology teachers. In these conditions, the list of educational information sources is supplemented by a resource of interactive software tools, databases and information and reference systems. The instrumentation of educational activities is enriched with computer simulators, control programs and other communication means - local computer networks, Internet facilities. Information and communication educational environment has been created on the basis of information and communication technologies.

In these conditions, subject-subject relations arise: the student himself, his motives, goals and psychological characteristics will be at the center of learning. All methodological actions (organization of educational material, methods and methods used, exercises, etc.) will be aimed at the student's personality, his needs, abilities, activity, intelligence, etc.

3. The methodological system focused on increasing the inclinations, abilities and interests, organizational and didactic aspects, the organizational and didactic system for the effective use of interactive software in biological education has been improved with the help of necessary technical equipment (computer, electronic board, projector, smartphones), control systems teaching in the electronic educational environment LMS (MOODLE, ILIAS, eFront, eStudy, etc.), educational Internet resources (MOOC, V-academia), pedagogical software (training, monitoring, teaching, demonstration, simulation, game, problem training, information and reference, etc.), interactive software tools (interactive: educational and methodological complex, textbook, reference book, simulator, tasks, laboratory exercises, visual aids), interactive equipment (interactive board, tablet, plasma panel, test systems and etc.), and Interactive technologies (web-quest, virtual laboratory, mind games, QR-code), web services (prezi.com, plickers.com, zunal.com, bestwebquests.com)[6].

4. In improving the use of interactive software in biological education, it is necessary to pay special attention to the strengthening of methodological support. For this, a mechanism was developed for enriching electronic resources of interactive software tools used in biological education by developing classes, interactive tasks, tests created on the basis of interactive presentation materials, an electronic textbook, an interactive complex, interactive technologies; constant addition of new materials and implementation of the site (dr-ergasheva.tdpu.uz).
5. Currently, a typological model (standard) of the system of educational publications for higher educational institutions has been approved, which, based on the definition of place and meaning in the educational process, the differentiation of functional characteristics, includes the analyzed, divided into four groups, editions: program-methodical (educational plans and curricula); educational and methodological (methodological instructions, guidance, materials related to the content of teaching methods of educational areas, studying the course, performing coursework, final qualification works); educational textbooks, teaching aids, lecture texts, lecture notes); auxiliary (workshops, collections of exercises and tasks, literature, books for reading); control (test programs, databases).
6. Achieved the provision on the basis of the stages of development of the process of effective use by students of interactive software used in biological education, before acquiring the skills of preparation for professional activity at the organizational-managerial, explanatory-motivational, cognitive, technological, and creative levels.
7. The use of interactive software in biological education allows you to optimize the time of the lesson, the use of operational methods for monitoring the level of knowledge of students, to implement training in an electronic educational environment based on the Moodle system, QR code technology, systematic organization of monitoring work.

5. REFERENCES

- [1] Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the Strategy of Actions for the Further Development of the Republic of Uzbekistan". - Collection of legislation of the Republic of Uzbekistan, 2017, No. 6, article 70.
- [2] Savelyeva M.G., Novikova T.A., Kostina N.M. Using active and interactive educational technologies: a method. recommendations. / - Izhevsk: Publishing house "Udmurt University", 2013. -P. 5.
- [3] Artyukhina M.S. Interactive learning tools: theory and practice of application. - Barnaul: IG "Si-press", 2014. – 168 p.
- [4] Ergasheva G.S. Improving Pedagogical Potential of biology teachers in the Context of Interactive Software Use // Eastern European Scientific Journal. –Germaniya,2017. –№1. – P. 148–152.
- [5] Ergasheva G.S. Strategies for improving the effective use of interactive software in Biological Education // European Sciences review.Scientific journal № 1-2 (January-February), –Austria,2018. –№1. –P. 181–183.
- [6] Ergasheva G.S. Organizational and Metodological Features of Creating Electronic Educational Resources For Biology Class// The Advenced Science open access journal. – ESPANA, 2012. Diciembre. – P. 34–36.

- [7] <https://en.wikipedia.org/wiki/Interaction>.
- [8] Ergasheva G.S. Increasing the efficiency of using interactive programs in biological education. Monograph. Science and technology, IT:. 2017. –220 p.