THE METHODOLOGY OF THE FORMATION OF INFORMATION CULTURE OF STUDENTS IN BIOLOGY

Aubakir Aidana, *master's degree student of biology, Kazakh National pedagogical University after named Abai, Almaty, Kazakhstan*
Maimataeva Asiya, *PhD doctor, Kazakh National pedagogical University after named Abai, Almaty, Kazakhstan*
DOI: https://doi.org/10.31435/rsglobal_conf/28022021/7432

Abstract. *The article deals with the dynamic development of information and communication technologies and their impact on the education system, as well as the importance of forming an information culture of students through the use of information technologies in biology lessons. For biological science, which is constantly updated and updated information base, the use of information technologies in the educational process is becoming more rational and acceptable. In particular, the use of a virtual laboratory, an online microscope, multimedia information systems and various animations in biology classes makes the lesson interesting and useful. Thus, with the help of systematic informatization, students can be helped to study in an open education system, to form a system of thinking and independence.*
This article contributes to the formation of information culture in the process of teaching and training students through information and communication technologies using new information systems in biology lessons and contributes to a more detailed understanding of the problem of Informatization of education.
Keywords: *information culture, information and communication technologies, computer literacy, informatization of education, formation of information culture*.

Introduction. The process of informatization all over the world is considered to be a key condition for the successful development of society, the dominant trend in the development of civilization in the 21st century. Thanks to the rapid development of informatics, telecommunication systems and new information technologies, a new information environment for the habitation and life of tens and hundreds of millions of people is emerging on our planet, and an information society is being actively formed. The active development of information technology and the formation of an information society have influenced the educational system.

Modern society is more and more in need of new information and big news from modern knowledge. Therefore, due to the rapid development of new information technologies and excessive information content, there is an intensive informatization of the educational process in the country. Thus, it should not be excluded that the level of development and application of modern technologies in each country is determined not only by the development of its material base, but also by the level of information development of the population, the ability to form, master and apply new knowledge. All this is directly related to the level of development of education in the country and the problem of informatization of education.

Main part. Informatization is an organizational, socio-economic, scientific and technical process aimed at the formation and development of information resources, information systems based on the use of information technologies in order to meet the needs of each person and legal entities in information.

Informatization of education is a process full use of new information technologies in the theory and practice of the educational area and take advantage of it in the conditions of implementation of psycho-pedagogical training and education.

The main directions of informatization of education are determined by:

- creation of an information and educational environment at the level of an educational institution, considered as a set of works that ensure the technology of its functioning;
- system integration of information technologies in education, providing educational process, scientific research and organized management;
- creation of a unified educational information space.

The education system can no longer remain unchanged in the turbulent maelstrom of social change, and the mutual adaptation of society and education is a strategic necessity, the absence of which can be disastrous for both the education system and society as a whole.

The problem of informatization of education is an urgent problem of the XXI century due to the following factors:

- the process of rapid development of informatization of society, which is a manifestation of the general pattern of development of civilization, has acquired a global character and has covered almost all developed countries of the world;

- the rapid development of ICTs and their widespread introduction into social (educational, industrial, etc.) practice have led to the formation of a new information environment of society.

Informatization of education is developed as a certain purposeful human activity for the creation and implementation of various programs and technologies. Namely:

- in the educational process for the preparation of citizens;
- improving the quality of general education and professional training of specialists;
- in the management of the education system;
- in methodological and scientific-pedagogical activities;
- development and implementation of new educational technologies.

Under the means of informatization of education is understood computer hardware and software equipment, as well as their content content used to achieve the goals of informatization of education. And the means of information technology include: electronic computers (computers), personal electronic computers (computers); Set terminal devices for all classes of computers, local area network, the input and output of information, the means of entering and manipulating text and graphic information, tools, archiving large amounts of information and other peripherals modern computers; devices and inverse transform the data passed in graphics and sound form; modern means of communication; artificial intelligence; systems computer graphics; software systems (programming languages, streamers, compilers, operating systems, application packages, etc.), etc. In this regard, the basis for the formation of computer science and information culture is computer literacy.

Computer literacy is a technical component of Information Culture (Table-1). The computer comes to the aid of a person in processing information, evaluating it, transmitting it, etc. Computer literacy is the knowledge of a computer, its functions and capabilities, it is the ability to use ICT tools to solve information problems.

Table 1. The relationship between computer literacy and information culture

Computer literacy	**Information and communication competence**	**Information literacy**	**Information culture**
acquire a minimum set of computer skills.	the ability of students to use information and communication technologies.	have the knowledge and skills to identify the information needed to solve a specific problem or complete a task.	one of the components of universal human culture, a set of information worldviews and systems of knowledge and skills.

The formation and development of information and communication competencies of students includes the formation and development of information and communication competences of students in the process of learning and general education, including: the ability to cooperate and communicate, independently acquire, supplement and integrate knowledge; the ability to solve personal and socially significant problems and apply solutions in practice using information and communication technologies.

Information and communication competence is a part of information culture at a basic level and a set of knowledge, skills and personal values for the effective implementation of various types of information services and the use of new information technologies to address socially significant life issues.

Information literacy is a tool that allows people to determine their information needs, localize and assess the quality of information, accumulate and restore information, conduct effective and ethically correct use of information, as well as create other information and share knowledge.

Information culture should be considered as the level of organization of information processes and the level of satisfaction of people with information communications, the level of efficiency in the creation, collection, storage, processing, transmission, presentation and use of information, providing a holistic view of the world, forecasting the consequences of decisions.

The main components of information culture are:

- information (computer) literacy;
- information competence;

- information-value-semantic component;
- information and cultural component;
- reflection of information.

The process of forming these components takes place in the process of productive educational and cognitive activity. Thus, during the lesson, new teaching methods, including modern information technologies, should be used along with traditional ones during the lesson.

Methodology. At the moment, such dynamically developing sciences as biology, chemistry, physics and computer science are filled with new information every day. Therefore, the use of new information technologies in teaching biology has become a requirement of today. The main distinctive feature of the use of new information technologies in biological education is the redistribution of information flows in the classroom. The teacher's dialogue with students is carried out through a digital educational resource. In this case, students become active participants in the educational process. Active activity of students leads to a significant increase in their motivation, stimulates active search and cognitive activity.

In general, biological education needs new information technologies that increase the information content, visibility and personal orientation of the educational material. They provide the formation of a systematic image of the mastered biological process or concept, its holistic, holistic representation. The greatest degree of expression when using new information technologies is advisable to provide computer modeling of biological processes and phenomena, rather than video fragments. In addition, priority should be given to modeling using information technology. In contrast to the real process or its video publication, the computer model allows the student to focus on the main, most important characteristics of the biological processes under consideration, to abstract from secondary features, to position themselves as within the "system". An important condition for the consistent introduction of new information technologies in biological education is the availability of the necessary hardware infrastructure. It should include computer-based workstations for teachers and students, new information technologies, communications, devices for receiving and transmitting information, visualization and documentation.

The use of computer technologies in the process of teaching biology can be carried out in several directions:

The first direction is Information support of the discipline using standard software-various electronic textbooks and interactive visual aids. These include: electronic textbooks, images, texts, 3D, 2D, gif animations, videos, models, virtual laboratories, etc.

The second direction is the development of a lesson using a multimedia digital projector, a carefully selected video series that will help illustrate the theoretical material presented in the lesson. Multimedia presentations are effective forms of presenting biology material. This form allows you to present the training material in an algorithmic order in the form of a system of bright reference images filled with comprehensively structured information. At the same time, students use various channels of perception (visual, auditory, kinesthetic and discrete), which allow placing information in the memory of students not only specifically, but also associatively.

The third direction is conducting experiments, practical work and virtual laboratory work. When studying the material in the biology lesson, great importance is attached to the demonstration experiment and laboratory practice. To date, very interesting computer (virtual) laboratories have been created, in which students and teachers can conduct various experiments and laboratory work on a computer screen, for example: to conduct various chemical reactions, to examine cells under a microscope.

The fourth direction-computer technologies allow to carry out intermediate and final control in the form of various test tasks in the audience. The tests are processed quickly and the results are visible immediately. Tests allow you to test the theoretical and practical knowledge, skills and abilities of students.

The fifth direction is the use of the Internet for the preparation and conduct of classes. The Internet is used for various didactic purposes:

- first, you can set a task-to find additional educational information that can be reused every time;
- secondly, the ability to find information: to find fundamentally new information, to compare it with known data, i. e. to create a problem situation that initiates constructive communication;
- third, you can prepare tasks for making a review (analytical review, digest, abstract) on a pre-formulated topic, which can be evaluated as a student's project work.

Research results. Recently, various computer programs have been developed for students and teachers of biology: electronic textbooks, reference books, online encyclopedias and educational games, online microscopes, virtual laboratories in biology, programs for test and training, practical tasks. These computer programs are the best visibility, not only for schools that are not equipped with classrooms and technical devices for biology, but also for those that have all the opportunities to study biology in general. Therefore, the introduction of various computer programs in the process of teaching biology contributes to the enrichment of the teaching content and provides access to various resources for visual learning, thereby giving it a logical character, and also solves such problems as the development of students' creative abilities and finding ways to activate their interest. That is, using such computer programs, the biology lesson becomes not only interesting and informative, but also in the course of work, students can develop their creative abilities and apply them in the future.

A great contribution to the formation of the information culture of students in biology lessons is made by social networks and various websites. In turn,the creation of websites is one of the methods of forming the information culture of students. In addition, the teacher can share information in various directions with his students, opening a website with an individual approach to himself and his students. In addition, the network is of great importance both for the teacher's self-education, as well as for preparing for the lesson and using its rich resources.

Therefore, in the era of the development of information and communication technologies, as well as within the framework of the "trilingual policy" program, a website was opened in Kazakhstan, which will become the basis for studying biology in English and an assistant for biology teachers.

The site contains various resources for teaching biology in English and materials for teachers. The site is called "Biology tips" (Fig. 1). On the website for conducting biology lessons in English, such as:

- biological video materials (with a direct link to YouTube);
- animations and images in 2D, 3D and gif format;
- short-term lesson plans for teachers;
- individual, creative works of students;
- presentations and interesting biological facts.

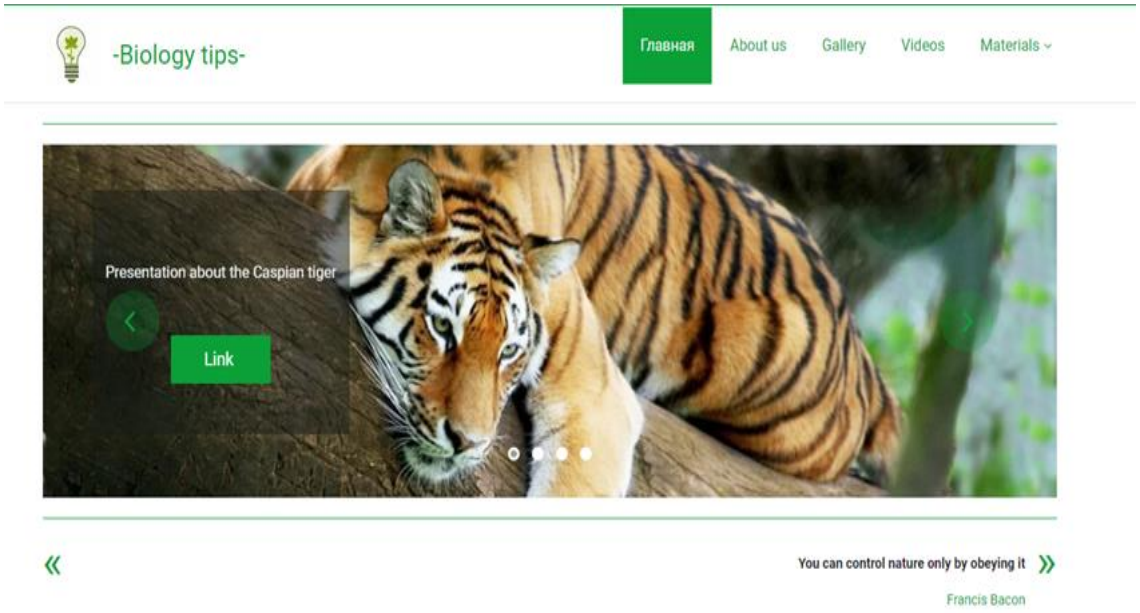

Fig. 1. Website "Biology tips"

At the moment, the site is actively used by students during a biology lesson. In addition, students independently create electronic 3D, 2D and hyphal models. The works of students are displayed on the site. In addition, the site is actively used by teachers during the lesson, as there are many interesting resources on the site. Thus, conducting classes using this site allows:

- to build an open education system, which each provides its own learning path;
- change the traditional organization of the learning process of students, forming their systemic thinking;

- correctly organize and implement the cognitive activity of students in the course of the educational process;

- use information and communication technologies in order to individualize the educational process and turn to new cognitive means and resources;

- to study some phenomena and processes in the micro and macroworld, using computer graphics and models;

- to represent various biological, physical, chemical processes that actually occur at a very high or low speed;

- to form the information culture of students, using different information technologies in biology lessons.

Conclusions. In general, the formation of an information culture means the free functioning of the process of searching, collecting, processing, storing and transmitting any information necessary for students in the education system through personal computers, hardware and computer networks.

With a high level of information culture formation, students show interests and needs for information, a voluminous information collection, an excellent outlook and fluency in information processing methods, the formation of high moral qualities, extensive knowledge of information sources, the ability to critically evaluate information and excellent knowledge of information and communication technologies.

In this regard, we would like to offer students the values that are formed during the study of biology:

- students develop flexibility in the ability to perform information processes, the ability to replenish their knowledge base with valuable information, etc.;

- formation of students' interest in meaningful information, effective use of innovative technologies and interactive teaching methods;

- students' mastery of information technologies of training, the ability to use electronic textbooks in their activities is formed.

REFERENCES

1. Erzhanova A. Use of information technologies in education. - Almaty. 2005. - 188 p.
2. Voronina T.P., Kashitsin V.P., Molchanova O.P. Education in the era of new information technologies: (Methodological aspects). -M., 1995. - 203 p.
3. Tikhonov M.Yu. Informatization of management of science and education (philosophical and methodological analysis): dis. … Dr. Philosopher, Sciences. - M., 1997. - 60-61 p.
4. Kuchina T.S. “From computer literacy to information culture”. - Electronic collection. - Koryazhma, 2016. -5-7 p.
5. Bogdanov N.A. Biology software review. Biology at school. 2007.- No. 1 - 60-63 p.
6. Bekova S. M.., Yakupova R.I., Tastanbekova G.N., Basics of information culture. Textbook / - Almaty: Bastau Publishing House. - 2011. - 22 p.
7. Website " Biology tips" http://biotipp.ukit.me/
8. Kartashova N. S, Kulitskaya E. V. Innovative teaching of biology in educational institutions: Study guide / - M.-Berlin: Direct-Media, 2016. - 57 p.
9. Zakhada N.V. The use of computer technologies in biology lessons to enhance the educational activities of schoolchildren (www.goo.kz/files/articles/art_783.doc)
10. Pugach OI Formation of information culture of secondary school students as a factor in the humanization of education: dis. ... Cand. ped. sciences. - Samara, 2000. - 40 p.