

DIGITAL TECHNOLOGIES FOR FUTURE BIOLOGY TEACHERS

Zhukesova A. R.

ruslanova.almira@bk.ru;

Master's student in specialty 7M01505 - Biology in Education of the
Department of «Biology and Fisheries»

Kh. Dosmukhamedov Atyrau University, Atyrau, Republic of Kazakhstan
Scientific consultant PhD, Associate professor Sh. Zh. Tapesheva

Introduction. In the modern world, digital technologies play an increasingly important role in education. In many countries, including Kazakhstan, digital technologies are being actively introduced into the educational process. Digital education provides greater flexibility in learning, improves the accessibility of education and expands opportunities for distance learning. Digital technologies in education are used by any educational institutions - schools, colleges, universities [1].

Objective: In this article, we will look at several modern trends in the development of digital education.

Not many years have passed since a school lesson was associated only with printed textbooks and notebooks, with a regular board and chalk. Now the learning process can include various digital technologies: online courses, electronic versions of textbooks with various interactive features, Internet lessons, interactive boards, educational applications for phones and tablets, multimedia projectors and others. The subject of biology occupies a special place in the field of natural sciences. This subject is designed to form in the younger generation an understanding as a basis for a humanistic worldview, which is the greatest value in life. Digital materials are photographs, video fragments, static and dynamic models, virtual reality objects and interactive modeling, cartographic materials, sound recordings, symbolic objects and business graphics, text documents and other educational materials necessary for organizing the educational process presented in digital form. Conducting lessons using digital materials is a powerful incentive in learning. Through such lessons, students' mental processes are activated: perception, attention, memory, thinking; cognitive interest is excited much more actively and quickly [2,3].

Currently, schools have a new material base, chemistry and biology classrooms are equipped with an interactive whiteboard and other interactive equipment. In classes, students use a tablet or computer and have the opportunity to use phones with free Internet access. Therefore, the use of educational platforms for the subject of biology opens up new opportunities and new ways of obtaining information in the classroom. Many learning platforms (Zoom, WebEx, Moodle, Goggle Services, Social Medias Jamboard, Padlet, Microsoft Teams) have built-in functions for providing feedback and assessing completed assignments (Fig 1.). Some platforms offer ready-made assignments on a topic, allowing teachers to effectively organize the course of the lesson, clearly present new material, and provide high-quality information to children with well-developed visual perception of information using video lessons [4,5].



Figure 1- Educational digital platforms in biology

During the lesson, you can use various biology-related games from the *Spongelab* platform, such as the online science game *Build a Cell*. The game tells about different living organisms, animals, bacteria, and fungi. The simulation game *Dissection and Autopsy* allows you to get acquainted with organisms in the human body and introduces topics such as microscopy and genetics. Biology is one of the subjects that consists of experiments, and some experiments are dangerous to conduct during classes, so online educational platforms eliminate this danger. For example, the online laboratory *Virtulab* can be used not only for biology, but also for chemistry and physics [6].

The *Padlet* platform offers ready-made lessons and ready-made texts, presentations, pictures, audio and video materials on the subject of biology. These materials can be used not only by teachers, but also by students to develop their creative abilities. They can also submit their own materials and participate in competitions held among students on the platform. With the help of the online platform *Kahoot*, you can organize a quiz, test or game to summarize the lessons. In turn, it is obvious that the visual effects of the platform and the music used increase the interest of students.

Digital teaching materials cannot be considered only as new educational opportunities. They form new skills and abilities. Students now have the opportunity to use other materials to prepare for lessons and for self-study. It is the educational process using such materials that changes the student. The results of the process are expressed in the student's achievements (academic and personal). First of all, it is most likely not the process of acquiring new knowledge, but the process of forming new skills and abilities. It is precisely this result that lessons using digital materials should be focused on [7,8].

Moodle is one of the platforms that allows students to work independently, learning a wide range of information. This platform is based on a distance learning system designed to determine the level of student feedback, the T. Guerra scale is used. According to Guerra's concept, determining the level of feedback in the subject of biology consists of 6-7 levels, and the level of the general scale reaches 8. The innovative educational and methodological complex of biology teaching methods is a new generation complex, for example, an e-book, video lessons on the subject of biology are built into Moodle, and students can view them at any time using a smartphone or computer [9].

The *electronic form of the textbook* is a tool for organizing a modern lesson using digital technologies. The use of the electronic form of the textbook solves a number of general

methodological problems, with its help it is possible to implement the requirements for educational and methodological equipment. The electronic form of the textbook differs significantly from a simple pdf version of a paper textbook and has many different functions, including interactivity and "flexibility" of content (audio and video files for sections of the textbook, the ability to make notes and bookmarks in the educational material, etc.).

The content of the electronic textbook is completely consistent with that in the paper format, but allows to interest the student with its interactivity, visual illustrations. Students strive to reduce the time for training, and therefore the tendency towards professionalization of education is growing, therefore the electronic form of the textbook in such cases is the best and most convenient option for independent study of the subject and readiness for the future profession. All the listed modern technologies will help students to better assimilate the educational material by increasing the clarity and interactivity in training (videos, presentation of material in the form of presentations) [10].

Zoom is a video conferencing platform for distance learning based on the digital education system. This platform eliminates the distance between the teacher and the student, provides the opportunity to communicate in real time, exchange opinions with each other, and analyze the previous lesson. The *Zoom* platform does not limit the lesson to the level of books, notebooks, presentations, but also allows the use of video materials and various games.

Online courses are an important trend in digital education. They are a way to gain knowledge without having to attend classes. Many universities and colleges, schools offer online courses, which can be free or paid. This allows students to study topics that interest them, and not just those offered at the institution or school.

Mobile devices such as smartphones and tablets are associated with many new opportunities in education. Mobile devices allow students and pupils to access educational materials and resources

anywhere and at any time. They also allow the use of mobile applications that are specifically designed for education. This can be both educational material and educational applications that allow students and pupils to work with tests and assignments [11].

Many people confuse digital learning with distance learning, but these are different concepts. Distance learning does not always require digital tools. For example, 10-15 years ago, materials were sent by regular mail. And digital technologies, in turn, are used regardless of the format.

One of the key elements of digitalization of education is online platforms and distance learning. These tools allow pupils and students to access educational materials, complete assignments, and communicate with teachers from anywhere in the world. This approach increases the flexibility of learning and makes it accessible to a wide range of audiences, including those who were previously limited by geographical or time constraints [12].

In order to use digital technologies in the classroom, the teacher must constantly develop and be open to all new technologies. In order to successfully use this technology at school, it is necessary to develop the information competence of teachers, and this, in turn, contributes to the development of the information competence of students:

- improve interdisciplinary communication;
- discover motivation for learning;
- activate students' cognitive activity and active participation in the educational process of each student;
- develop the ability to work independently;
- develop skills for working in large and small groups;
- create an atmosphere of cooperation in the classroom;
- strengthen the student's self-confidence;

Therefore, the use of innovative methods and digital technologies in biology lessons increases the activity and interest of students, allows them to develop creativity and think quickly, expand their thinking and worldview [13].

Digital technologies make it possible to create interactive educational materials that stimulate the active participation of students in learning. These can be multimedia presentations, online tests, virtual labs, etc. The use of such materials contributes to a deeper understanding of the educational material and the development of critical thinking. Virtual and augmented reality technologies open up new possibilities for creating immersive educational experiences. With their help, students can immerse themselves in virtual environments, simulate real situations and experiment without physical limitations. This is especially useful in areas where practical training is required, such as natural sciences, medicine, engineering, and the arts [14].

Conclusion: Thus, it can be stated that digital education is one of the main trends in education at present. It provides greater flexibility, improves accessibility of education and expands opportunities for distance learning.

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