Digital learning technologies in the University education system

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Abstract. Digital educational resources developed by the authors for information and methodological support of subject disciplines in the system of university education are considered. The digital learning technologies and the capabilities of the electronic resource “Book” are analyzed.

The idea of using digital technologies in teaching is related to the implementation of the new industrial revolution - Industry 4.0 [1], the development of innovative technologies for recycling and the production of new materials [2, 3] and, as a result, the implementation of the University 4.0 model. Digital learning technologies allow to expand the accessibility of education, enhance the productivity of the learning process, make it possible to build an individual training program taking into account the educational needs of students. The success of the modernization of education also involves the work of teachers in the new information-educational environment [4, 5] with information in digital form.

Digital learning technologies are widely implemented in the Kazan Federal University. Consider as an example the discipline "Didactics of Chemistry", developed at the Department of Chemical Education, the curriculum for the preparation of bachelors of pedagogical education in chemistry. For the information and methodological support of this discipline, the digital educational resource “Didactics of Chemistry” has been developed. Of greatest interest are such topics as “Innovations in the development and education of students by means of chemical education” and “Innovative chemistry training”. The content of both topics is presented through the electronic resource "Book".

The resource “Book” allows the developer of an electronic resource to create, like a book with the corresponding chapters and paragraphs, a digital educational sub-resource. At the same time it is possible to include media files, video clips of real-life experiences and projects. In general, it is possible to create an electronic portfolio of students' creative works, which is important for developing their value-semantic competence and engineering thinking based on project-based learning [6, 7]. For the development of critical thinking of students, the technology of smart cards is used, which is presented in the topic “Innovative teaching of chemistry” also through the digital resource “Book”. In addition, the resource “Book” made it possible to consider the use of modern digital technologies such as webinars, online schools, conferences, and the Olympiad in training.

Briefly consider each of the marked modern digital learning technologies.

Webinars are a relatively recent training technology that has become popular over the past three years. Its essence lies in conducting online training sessions on a special online platform. One of the applications of webinars is education and preparation for a unified state exam and competitions in various subjects, including chemistry. On webinar platforms, there is an online board where the teacher can clearly explain the material, it is possible to download presentations, illustrative material, video materials, including video experiments. The developing component of webinars, as noted in [8], is the ability of students to work in a team and be attentive to the study of the material. The advantage of webinars compared to other innovative technologies in the following:

- • unification of students from different cities, settlements of the country, otherwise, expansion of access to the educational process;
- • facilitating the educational process, in other words, enhancing its productivity;
- • relaxed perception of traditional educational information;
- • carrying out visual video experiments.

The technology of online schools used in the preparation for the Olympiads and the unified state exam in all subjects is represented by the following resources.

Online School "Foxford" [9]. Its advantage is that Foxford courses are conducted by teachers from leading universities of the country, members of the jury of All-Russian School Olympiads, experts of the unified state exam and the main state exam. The average teaching experience of teachers for more than 7 years. This online school provides training in all school subjects. Classes are held either in groups or individually in the format of online tutoring on a special platform. The advantage is the availability of an online tutorial for filling gaps in knowledge. The disadvantages include, firstly, the lack of an interactive whiteboard and presentations (during classes, the teacher records in chalk on a traditional blackboard, which, in turn, does not fully comply with the principle of visibility of training), secondly, the lack of a mentor to check homework.

The online school "Lektarium" [10] exists relatively recently - about 2 years. The teachers of this school are university students or young university graduates. Lectarium differs from the previous online school in that information is not always given in a strictly scientific language, but in an accessible, often unconventional form.

Online School "Examer" [11]. This school is completely different from the rest. Examer aims to prepare students for the unified state exam. Preparation takes place in a competitive form. This school has no teachers and mentors who can ask a question. The essence of this school is that the student chooses a subject of interest, creates a personal account. In his private office, theory and practice are available to him for specific exam assignments. To check the correctness of the solution of tasks, the student must go to the "new level", that is, perform new tasks. This school is not very effective for students with a low level of basic knowledge.

The next technology, which is gaining more and more popularity, is the technology of online Olympiads and online conferences, which is very useful for highly motivated students. The advantage of this technology is associated with the possibility of a significant expansion of geography and the number of participants in the educational process, the popularization of science among the younger generation. The tasks of online Olympiads in all subjects correspond to the Russian Federal State Educational Standard and, for example, in chemistry, make it possible to form systematic ideas about chemicals and their transformations; learn chemical language; improve knowledge and develop an interest in the study of chemistry.

The advantages of online competitions include:

• lack of costs for the organization and holding of competitions and conferences;

• a wide opportunity for everyone to participate in the Olympiad movement;

• the olympiad platform is protected from cheating (as soon as the student tries to close the tab with the olympiad, either the attempt is blocked or the penalty points are charged).

A significant drawback of online Olympiads compared to full-time Olympiads is the impossibility of conducting a real experimental tour.

The following are the most popular and successful online Olympiads.

Interregional multi-subject Olympiad of Kazan Federal University for schoolchildren [12]. The qualifying round is held remotely on an online platform using distance learning technologies. Every year, about 2,500 schoolchildren take part in this Olympiad only in chemistry, of which only 45% are following a full-time final stage of the online tour.

The All-Siberian Open School Olympiad [13] was organized in 1962 and is aimed at attracting schoolchildren to the study of natural science disciplines. Schoolchildren from more than 50 regions of the Russian Federation take part in this competition every year. In the 2018-2019 academic year, the Olympiad was conducted in the following subjects: astronomy, chemistry, biology, physics, mathematics, computer science. The All-Siberian Chemistry Olympiad is included in the List of Schoolchildren Olympiads and has the highest level - 1. The All-Siberian Olympiad has three stages: the first is a full-time qualifying, the second is an absentee qualifying, the third is a full-time final. At the second stage, students perform tasks remotely using educational technologies.

The Internet Olympiad "SESC Moscow State University" [14] is held for schoolchildren of 7–10 classes in five subjects: mathematics, physics, chemistry, biology, computer science. The Olympiad is held remotely in three stages: training, qualifying, final. The tasks of the qualifying stage are quite unusual, related to human life and the history of the natural science phenomenon. Winners and winners of grades 9, 10 in one of the subjects are invited to attend the full-time Olympiad "Kolmagorov" with the provision of a hostel. Winners and prize-winners of 9, 10 classes in two subjects are invited to participate in the spring gathering of the SESC of Moscow State University named after Lomonosov out of competition.

All considered digital learning technologies are successfully mastered by students in the process of studying at the university, which allows them to be willing to work with information in digital form in their future professional activity.

Thus, as a result, the use of modern digital educational resources developed by university teachers in support of subject disciplines is used by students to learn online how to apply digital learning technologies in future professional and educational activities.

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