

## Technology of e-learning in the university education

I R Gilmanshin<sup>1,2</sup>, S I Gilmanshina<sup>1</sup>

<sup>1</sup>Kazan Federal University, 18 Kremlyovskaya street, Kazan, 420008, Russian Federation

<sup>2</sup>Kazan national research technical university named after A N Tupolev, K. Marx St. 10, Kazan, 420111 Tatarstan, Russia

is-er@yandex.ru

**Abstract.** Distinctive characteristics and disadvantages of electronic resources are distinguished. The structure and specificity of the developed author's practice-oriented electronic educational resources are considered. The application of e-learning technology as an active student-centered training for building individual educational trajectories in university education is substantiated.

In accordance with the world trends in the development of education, and university, including today, the actual technology is e-learning, based on the use of distance learning technologies in the form of electronic educational resources.

In Russia, the use of distance education technologies and e-learning in a network form is given increased attention at the state level. The priority project is the "Modern digital educational environment in the Russian Federation", whose passport was approved by the Presidium of the Council under the President of the Russian Federation on October 25, 2016.

Distance educational technologies are considered as a set of methods, forms and means of mediated, as a rule, through the Internet interaction of trainees with each other and with the teacher in the course of training.

The federal state standard of higher professional education provides for the active use of electronic educational resources in the course of training. Today, in the context of the new information and educational environment [1] of higher education, the relevance of electronic educational resources is unquestionable, since society needs professionals with professional thinking [2, 3] with emphasis on energy management [4] and information culture [5].

Under the electronic educational resource we will understand the educational resource presented in electronic digital form and including the structure, subject content and metadata.

Below are highlighted the distinctive characteristics of electronic educational resources, making them popular among learners and promising in application. This - accessibility, interactivity, convenience of information retrieval, openness for introducing new information and data, the possibility of studying the teaching material by students independently with the activation of cognitive activity, the possibility of studying various processes without the use of reagents and equipment.

The following indicators can be classified as essential shortcomings of electronic educational resources. Daily work on the Internet raises the issue of human information security. It is necessary



to constantly update the technology in accordance with the requirements of the electronic resource. Simultaneously with the assimilation of the material of the electronic educational resource, it is necessary to remember the logical chain of judgments in the transition from one hyperlink to another, which can lead to a cognitive overload of the learner.

Nevertheless, today, electronic educational resources are being actively developed in many Russian universities. Similar resources of Kazan Federal University are available on the website [www.edu-kpfu.ru](http://www.edu-kpfu.ru), combining the previously existing on the basis of LMS MOODLE three sites: Zilant (<http://zilant.kpfu.ru>), Bars (<http://bars.kpfu.ru>), Tulpar (<http://tulpar.kpfu.ru>).

At the department of chemical education of the Kazan Federal University work on the introduction of electronic educational resources has been going on since 2010. At present, the following electronic resources are used in the educational process, developed by the teachers of the department: "General theoretical bases of analytical chemistry. Qualitative Analysis" (winner of the contest of the Kazan Federal University in 2013), "Methods of solving problems in physical chemistry in school chemistry", "Chemistry Practices", "Theory of Chemistry Teaching", "Chemistry Techniques", "Didactic Games in Teaching Chemistry" and others [6]. In addition, an electronic resource has been developed for the Admission Committee to prepare for a unified state examination on general and inorganic chemistry. For the Privolzhsky interregional center of professional development of education workers, an electronic educational resource "Improvement of the professional competences of the teacher of chemistry in the conditions of the introduction of the GEF LLC" has been developed and is being used since 2016 at the courses of teachers' qualification improvement.

Structurally, all developed electronic resources include metadata, a work program of the discipline supported by the electronic educational resource, a glossary, sample questions for credit or examination, methodological instructions for the student and teacher. For each topic presented lecture and practice-oriented material for auditor and independent work, information resources, basic and additional literature, current and final control.

As an example, let's consider the specifics of the practice-oriented author's electronic educational resource "General theoretical bases of analytical chemistry. Qualitative analysis."

The main difference of this resource is to contribute to the active study of the educational material, to develop the ability to think independently, to teach oneself thinking, relying on scientific chemical theories when solving problems and explaining natural phenomena. Otherwise, contribute to the formation of scientific thinking [7]. To do this, each topic is accompanied by a plan of presentation and methodological instructions, the organization of cognitive activity of students with the identification of a complex didactic purpose of studying the topic; lecture; information and cognitive unit, as well as a list of recommended educational literature. Given that historical facts are necessary for the general characterization of chemistry as a field of science and the development of a strong interest in it, every lecture provides information relevant to the history of chemistry. The content of the methodical block "Organization of cognitive activity of students" complements lectures. This relationship is focused on achieving the main goal of training - mastering the fundamental knowledge of the fundamentals of analytical chemistry.

In this electronic educational resource for each topic includes a lot of special tasks for training (typical tasks) and cognitive (with elements of creativity) character. The purpose of the training tasks is to form appropriate skills and abilities for students. Moreover, examples of solving all typical tasks from the self-control unit are given in the content of the relevant lectures. The goal of cognitive tasks is the formation of professional thinking (for more details see [2]). To carry out creative tasks, not only profound knowledge and skills are needed, a critical evaluation of the results obtained, the main thing is a clear awareness of the problem in a specific chemical task. At the same time, this electronic resource does not replace the task book.

In conclusion, we note that, according to the results of the questionnaire survey of students working with electronic educational resources on chemical and methodological disciplines for more than four years, their motivation and the quality of university education have been increased.

In general, the use of e-learning technology as an active student-centered learning is beneficial for building individual educational trajectories in university education.

### References

- [1] Gilmanshina S I, Khalikova F D 2016 *Teaching Gifted Adolescents in Terms of the Transforming Natural Sciences Education* Ifte 2016 - 2nd International Forum on Teacher Education Vol 12 pp 50-54
- [2] Gilmanshina S I, Sagitova R N and et. 2015 *Professional Thinking Formation Features of Prospective Natural Science Teachers Relying on the Competence-Based Approach* Review of European Studies Vol 7 No 3 pp 341-49
- [3] Samigullina G S, Gilmanchina S I, Gaisin I T, Gilmanshin I R, Akchurina I R 2015 *Professional and Creative Development of Natural Geographic Course Teachers within the Process of Professional Retraining* International Education Studies 8(4)
- [4] Kashapov N F, Gil'manshin I R, Konahina I A et al. 2014 *System analysis of the energy complex of engineering enterprise as a basic tool of effective energy management* IOP Conference Series: Materials Science and Engineering Vol 69 **012024**
- [5] Gilmanshin I R, Gilmanshina S I 2016 *The formation of students' engineering thinking as a way to create new techniques, technologies, materials* IOP Source: International Scientific-Technical Conference on Innovative Engineering Technologies, Equipment and Materials Vol 134 **012006**
- [6] *Distance education of Kazan Federal University*. Retrieved 04/10/2017, from <https://edu.kpfu.ru/course/index.php?categoryid=369>.
- [7] Gilmanshina S I, Gilmanshin I R, Sagitova R N, Galeeva A I 2016 *The Feature of Scientific Explanation in the Teaching of Chemistry in the Environment of New Information of School Students' Developmental Education* International Journal of Environmental and Science Education Vol 11 Is 4 pp 349-58