Engineering Students English Teaching in E-Learning Environment

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Abstract. The article deals with the e-learning environment at T.F. Gorbachev State Technical University. The authors describe their experience of English teaching in e-learning environment at non-linguistic university. The reason of e-learning integration into the engineering students teaching is to increase the efficiency and quality of education for bachelor, master and postgraduate degree students. English teaching and students' independent work are based on blended learning principals because this model helps to achieve the required level of foreign language skills and learning quality. The method of English teaching in e-learning environment consists of three stages. The first stage is incorporation of blended learning principles and structure development of an e-course for technical English teaching; the second stage is the experimental model of the e-course design and its integration into educational process; and the third stage is development of principles to increase students' motivation and forming their self-education skills. The paper gives the results of the experiment carried out at the foreign languages department of T.F. Gorbachev Kuzbass State Technical University since 2014 to 2019 academic years.

1 Introduction

The increasingly competitive global marketplace for jobs and education has led to education requirements increasing and ongoing training in order for individuals and organizations to remain competitive. Educational institutions are adopting online learning and information systems at a rapid pace, with 65% of higher education institutions identifying online learning as a critical part of their long-term strategy [1-4]. The introduction of e-learning and blended learning in Russia is associated with the implementation of e-learning technologies in the educational process, the formation of global environment for intercultural and interdisciplinary integration, as well as the actualization of continuous, distance and open education that forms the basis of the informative society [5-8].

We strongly believe that importance and implementation of e-learning environment in the system of higher education is due to the fact that modern society requires specialists who are not only professionally trained, but also use the "long life learning" strategy in

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professional development and self-development. Therefore, e-learning environment should provide not only studying conditions for required knowledge and skills, but it also should have potential for customized information learning strategies generation, for planning personal achievements, self-development and self-realization [8-10].

The aim of this article is to describe the method of English teaching for engineering students by means of e-learning environment at T.F. Gorbachev Kuzbass State Technical University (KuzSTU, Russia). The English teaching method in e-learning environment on the Moodle platform has been developing at KuzSTU since 2014. The purpose of using e-learning and distance learning technologies at the university is to increase the efficiency and quality of provided education, to intensify the learning process and to provide students with the opportunity to master educational programs regardless of their location and time to access electronic resources.

2 Experimental part

We consider that using the e-learning system on the Moodle platform at KuzSTU to teach English allows solving the following tasks:

- to provide access to e-courses for full-time and part-time engineering students from any device connected to the Internet;
- to implement the system of advanced training and professional retraining for teaching staff from any device connected to the Internet;
- to implement the distance learning system from any device connected to the Internet;
- to implement the principle of customization when each student has his own characteristics, strengths and weaknesses;
- to adapt all training programs for mobile platforms: phones are becoming an ally in training: e-books, educational tests, video lectures;
- to motivate students to study English by using modern methods and tools – the Internet, multimedia content, game elements – all these facilitate learning, turning it into an exciting process [11-12].

To organize English learning process and students independent work, we base our method on blended learning model and principals as using this model helps to achieve the required level of foreign language skills and learning quality. We believe that blended learning model helps to solve educational problems through an effective combination of the traditional form of education with elements of e-learning and methods of distance education. With the blended learning model, the teacher is in the centre of the educational process and with the help of new methods and technologies, as well as attracting a virtual environment; a teacher makes the educational process more accessible, effective and interesting.

With the variety of definitions of this technology, professors S. Graham and S. Bonk distinguish three main components of the blended learning model:

- full-time study, where a classroom is in the traditional way of learning;
- independent work, consisting in the search, analysis and systematization of information, including independent work in a e-learning environment;
- cooperative e-learning, involving the interaction of students with each other and the teacher using information technologies (Skype conferences, e-mail, webinars, forums, blogs, wikis, etc.) [3-4].

From our point of view, the blended learning model allows students to develop the ability to analyse and acquire knowledge, plan their work, select and receive the necessary

information, and be engaged in self-education. We teach student the following skills and abilities:

- ability to plan their activities and studying time independently;
- ability to make the right decisions;
- ability to work in e-learning environment;
- skills of independent learning;
- analytical skills;
- skills of presenting results using modern information and communication technologies;
- the ability to perform tasks at convenient time [3-4].

Our **first step** in creating the e-course for technical English learning is to develop its concepts and structure, which should be based on such basic principles as:

- 1) module structure (the modular structure of the course implies that each part of the course (educational material) is thematically completed and contains all the elements of the educational and methodological complex of the subject);
- 2) the principle of reverse course design (it means that course development is carried out in reverse order - from result to content);
- 3) the principle of professional orientation;
- 4) the principle of communication;
- 5) the principle of transparency (evaluation of work by both students and a teacher) universality and accessibility;
- 6) the principle of dynamism and mobility.

When creating the e-course, we relied on replacing classroom work with electronic interaction. Blended learning involves reducing the classroom activities, while maintaining the intensity of independent learning in electronic environment. In our opinion, electronic environment should allow engineering students to develop independent learning skills. Moreover, when creating the course, we also relied on the technology of the “flipped classroom”, which consists of theoretical material independent study, tasks motivating to search for an answer and discussions in forums [13-14].

At our **second step**, we have developed an experimental model of the e-course and its components. The structural components of an e-course may vary. Their set and number depend on the purpose and tasks of a particular academic discipline (or block of disciplines), as well as the direction of training (see Fig. 1).

Fig.1. E-course structure

The e-course is based on a semester basis, it includes 4 modules, each is designed for studying within a month, a module of additional tasks and a module of the final control. We start English teaching with entry testing of our students to determine their level of English skills. Electronic testing significantly helps to optimize learning process, accelerating the control of skills and abilities formation, it allows to devote more classroom time to other activities in regard of practical classes limits [15].

Three types of testing are applied in an experimental model of the e-course at KuSTU: entry testing, average semester testing and final testing. The purpose of the entry test is to assess the level of students' knowledge of a foreign language, to divide them into groups according to the level of knowledge. Average semester testing in the electronic environment takes place every month and corresponds to a monthly control. Average semester testing includes two types of tests: correctional and assessment tests. At the end of the semester final assessment test is done by a student in a computer class in the electronic environment in the teacher presence to be sure who performed the test.

In practical work we tried to incorporate electronic tests in all aspects of the e-course, so that students can monitor their progress and understand how and for what types of activities they get points (scores). We believe that methodically reasonable testing is the key to engage students in active and productive training; it enhances motivation to develop individual study skills.

After the students have passed the test and their level of English has been determined, they are enrolled in the e-course correlated with their level of knowledge. Students are given e-courses according to CEFR.

The e-course model is designed using as many forms of learning activities as possible. Table 1 presents the elements of e-learning environment, used at KuzSTU.

Table 1. Forms of Learning Activities.

Learning activity	E-Learning technology
Lecture	Video lecture, screencasts and training videos, interactive lecture, webinar
Seminar	Seminar, forum
Practical class	Virtual workshops, simulators
Laboratory work	Virtual workshops, simulators
Test	Test
Tutorial	Forum, messages
Student independent work	Test, individual task, glossary, discussion on the forum, seminar

At our **third step**, we have developed a number of principles, aimed to increase student motivation for future work and form their self-education skills.

Firstly, we suggest the principle of comfortable educational environment, when e-learning environment can be regarded as a motivating factor because it allows students to work in 'their' environment. Secondly, the principle of promoting 'badgings', when students see the most successful graduates and their achievements in the 'Awards and recognition board'. Thirdly, the principle of assessment is to motivate students to work in e-learning environment themselves, so it is necessary to include face-to-face assessment in learning process. The fourth principle is self-control, when students see their progress and can plan what tasks they need to perform in order to gain the required course score. The fifth principle of proper feedback allows establishing communication with a teacher; students know that their work will be assessed and scored [16].

3 Results

As a result, the experiment carried out at the foreign languages department of T.F. Gorbachev Kuzbass State Technical University since 2014 to 2019 academic years provided the following data. Experimental work allowed us to determine some positive aspects of students teaching in e-learning environment presented in Table 2.

Table 2. Advantages of students independent work in e-learning environment

	Students independent work	Teacher benefits	Student benefits
Active learning	• Testing • Peer review • Project work	• Time saving • Feedback • Teaching skills development and improvement	• 24/7 available resource • Work results • Comfortable learning environment
Passive learning	• Content reading, watching, listening	• Teaching materials are in system • Transferring of knowledge into virtual environment	• The ability to 'close' gaps in knowledge, trying again and self-assessment
Assessment	• Homework • Reviewing • Testing	• Papers and scores storage • Progress monitoring • Debts prevention	• Progress self-controlling • Expert skills • Self-educational skills

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