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Implementing Blended Learning Technology in Higher Professional Education

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Abstract

The paper dwells on the learning outcomes of experimental implementing of blended learning technology in the English language teaching to engineering students of the Tomsk Polytechnic University. The aim of blended learning application is to enhance efficiency of the learning process by means of up-to-date highly-technological means of instruction. The author identified the level of information competency of engineering students, analyzed psychological readiness of engineering students to handle information and communication technologies, verified the efficiency of information and methodological support of blended learning in teaching foreign language to engineering students and performed the processing and analysis of the experimental data.

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1. Introduction

The development of modern society occurs in the information age, characterized by the use of information and communication technologies (ICT) in many areas of human activity, including education. The peculiarity of the present stage of computerizing higher education is great importance of substantial aspects of student training at the university. Quality of higher education will largely depend on successful solution of this problem. University graduates have to live in an information society, and then it is not only necessary to master the methods of obtaining

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and processing information, but, above all, to learn to make rational use of information and information technology to maintain and develop their intellectual and creative potential (Obskov, et al., 2015).

Many researchers (Bersin, 2004; Dudney, 2007; Fomina, 2011, 2014; Kalmykova, 2013; Mijares, 2014; Shitova, 2011; Oxford, 2011; Tomlinson, 2013; Watson, 2008, and others) consider a rational combination of traditional educational technologies with modern information and communication technologies as one of the possible ways to solve the problem of modernizing education on the basis of information.

Currently, one of the promising applications of ICTs in education is blended learning technology. Blended learning is a combination of face-to-face learning with Internet-based training, especially of the second generation, which allows participants to cooperate in the educational process. Blended learning is recognized as training including 30 to 79% on-line training time (Clarc, 2003).

Thus, blended learning can be considered a sort of electronic learning or its extension; its main difference is the necessity of face-to-face communication of students with each other and with the instructor. Bonk (2006) states that blended learning, in a certain proportion, mixes face-to-face and distant learning technology, which allows simultaneously using two modes of training, eliminating almost all their shortcomings. An increasing number of people tend to receive their education with minimal time losses, since the rapid pace of life leaves less time for face-to-face learning. To date, blended learning is a fast and dynamic mode of training. Many large companies have already experienced its positive effect: employees receive high quality education on the job. Thus, it can be assumed that in the future blended learning takes a leading place among the traditional modes of education and becomes one of the main competitive advantages of higher education institutions providing educational services based on the Internet resources and face-to-face communication.

Thus, the paper, contributing to the English language teaching modernization, will identify the level of information competency of engineering students, expose psychological readiness of students for innovative means of teaching foreign languages as well as preferred modes of learning foreign languages, determine the level of linguistic competency of students, estimate the degree of student motivation and the development of professional skills in foreign language communication.

2. Research Methodology

2.1. Theoretical study and hypothesis

For effective delivering the academic courses by means of blended learning it is necessary, first of all, to develop methodological support of the syllabus. Methodological support of the syllabus defined by Jochems (2004) is teaching materials, designed to study a particular academic discipline, which include a set of interrelated by learning goals and objectives various kinds of pedagogically useful, substantive educational information delivered by various media resources. Blended learning consists of the following methodological support:

- teaching materials
- computer support, designed on the basis of modern information and communication technologies (Richards, 2012).

According to Fomina (2011), information support of the educational process of engineering students is considered as two interrelated components. The first component – content of the discipline, goals and objectives of education, aimed at mastering a certain amount of scientific knowledge; developing worldviews, cognitive activity, new economic thinking, creativity, entrepreneurship, needs to constantly replenish the knowledge; attracting interest to the professional activities; acquiring technical, economic and other skills.

The second component – software of the educational process: system and applied software, software systems used in one form or another, including the tools environment for designing training programs and software systems. Software also includes hardware which is meant to be used in the education information environment such as computing, telecommunications, satellite, television, peripheral, copying, office and other equipment, as well as data channels.

Rossett (2003) declares that software information support of educational activities of the universities in the field

of blended learning is largely dependent on the type of the university system, educational process organization, the level of computerization as well as information and communication training technology.

Methodological support is divided into two sections: training and organizational support. Training support is database of teaching materials, control system of the database, teaching methods, and tests, recommendations for blended learning technology in view of didactic and psychological aspects. Organizational support is, relevant to local and federal laws, modes of organizing educational process, as well as recommendations for the use of ICT. Thus, methodological support is a system of methods, tools and techniques to purposefully and consistently achieve high quality results in the education system (Matukhin & Evseeva, 2014).

Based on the foregoing, it is appropriate to present information and methodological support as a system composed of three subsystems: 1) content; 2) software; 3) methodology.

For the successful operation of the training system, the performance of each subsystem of information and methodological support (IMS) separately and its joint performance is required. The technology of designing IMS consists of the following steps:

- design of teaching materials
- development of the software structure
- computer design of the content and layout of the software
- test of the software and its modification
- development of methodological guidelines for students and instructors (Matukhin, et al., 2014).

Based on the results of the conducted theoretical study of didactic opportunities and psycho-pedagogical features of the ICT application in the learning process and the developed information and methodological support have been formulated the problem and the hypothesis of the study.

The hypothesis of the study: application of information and methodological support based on the principles of multi-level, modularity, humanistic and professional orientation of the content optimizes educational and cognitive activity of students, forms linguistic competency, develops academic autonomy and creativity, improves information competence of the future professionals.

2.2. Questionnairng

Questionnaire study started with the multilateral survey of the student population. The volume of knowledge and skills acquired during the foreign language learning at high school was identified; the personality motivation of each student (basic motives of educational activity, interest in receiving future profession, self-esteem, interpersonal communication methods, etc.) and their psychological readiness to use ICT in foreign language learning was studied.

In the process of observation and interviews the motives of students to study foreign language were revealed; their content preferences, as well as their opinion of the necessity of foreign language for an engineer were identified. As a result of observations and interviews it was exposed that the majority of students link the knowledge of a foreign language with the future professional activity (75%) and feel the need for professional foreign language (64%).

Studying the readiness of engineering students to use blended learning means in teaching foreign language was conducted in two ways: the first – the identification of the level of information competence of students; the second – determination of their psychological and motivational readiness for the use of innovative learning tools.

Maturity of information competence of students was tested by the method of questioning. In the survey were questioned 128 engineering students of the first year of education. The experiment proceeded from the fact that 100% of the students have got the opportunity to work on the computer because the university facilities are provided with Wi-Fi connection and several computer labs are equipped with the Internet access for the organization of independent study of the students.

The detailed guidelines for using each type of resources have been compiled in order to avoid undue influence of insufficient development of computer skills of the students in the experimental group on the results of their work

with ICT tools. In addition, extra time to become familiar with the basic elements of the user interface programs was given to the students. Thus, the actions were taken to minimize the negative emotions and psychological barriers that often occur when working with a computer, which could adversely affect the results of the study.

Level of psychological readiness of the students to work with the innovative means of information technologies was tested by the method of questioning and interviews with students. Moreover, questioning was carried out twice: before and after the experiment. Repeated questioning after the experimental study showed that opinion of respondents changed in favor of the preference to use the Internet resources as the main means of instruction (65% before and 99% after), but audio (25% and 58%, respectively), video (18% and 68%, respectively) and computer programs (30% before and 78% after) as an additional means of training.

The attitude of engineering students to the up-to-date information and communication learning tools changed due to the acquisition of skills to deal with them, since before entering the university most of the respondents had no experience in learning by means of information and communication technologies (27%). Therefore, the means of information and communication technologies are not enough common among former high school students, most of who were engaged in foreign language learning by means of traditional means of instruction. Internet resources are used mainly for writing papers, preparing essay and reports, translating texts by electronic translators. The findings also indicate a low level of motivation among the respondents, since with all the diversity and accessibility of teaching means, only 18% were engaged in further foreign language learning.

The next question that the students were asked was about the preferred modes of learning a foreign language. In the given options deliberately laid gradually increasing degree of independence and taking into account individual and personal characteristics of the student. The findings suggest that preference is given to the training organization which, in one form or another, takes into consideration the level of language proficiency and individual features of a particular student. Herewith, 94.5% of the students can get along without instructor's supervision, but in most cases the instructor is expected to show individual approach and to create comfortable emotional learning environment.

Thus, in the end of the questionnaire study the following tasks have been completed:

- level of information competence of engineering students has been identified
- psychological readiness of students for innovative means of teaching foreign languages has been exposed
- level of linguistic competence of students has been determined
- preferred modes of learning foreign languages have been identified
- level of student motivation has been estimated

2.3. *Experimental study*

Observation of the educational activity of engineering students in the process of working with the software, conducted interviews, and quantitative data of the experimental results indicate that interactive mode "human – machine" encourages creating conditions that eliminate psychological discomfort that will eventually reveal the potential of the trainees. Students acquire self-confidence which significantly rejuvenates training activities; there occurs an incentive for further work. The mode of active interaction with the program encourages developing their intelligence: mobilizing attention, improving the perception and memory (Thorne, 2004). Students become active initiators and supervisors of their independent learning activities, thereby increasing their self-awareness and self-esteem. Herewith, the instructor acts as a facilitator and consultant. Educator gains access to the test procedures and the ability to monitor the process of teaching material retention. Such training contributes to the development of need for the professional improvement of foreign language knowledge, learning motivation, emotional and creative spheres of the student's personality.

In addition, the educational information provided in these computer programs can be replaced by the instructor (without programmer) that ensures the implementation of the author's approach to presenting educational material and adapting it to the specific population of students.

Survey, conducted in order to identify the readiness of students to use ICT tools, showed relatively low levels of interest and utility evaluation of applying new technologies in the educational process: about 75% of respondents considered them as quite important and only 25% as very important. However, after the experiment the respondents showed high levels of interest and utility evaluation of applying new technologies in the educational process: about

20% as quite important and 80% as very important. Thus, students understand the significance and importance of ICT application in teaching the English language and show a high enough interest (average assessment of importance and interest).

To trace the change in the development of professional skills of foreign language communication during the experimental work (see Fig. 1), the absolute growth rate (AGR) was used, which shows the difference between the initial and final level of the given indices: $AGR = I_{fn}$ (final index value) – I_{in} (initial index value).

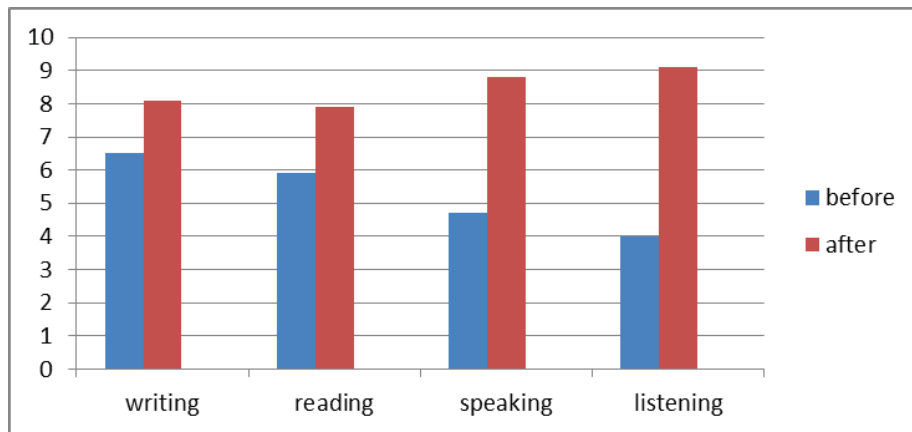


Fig. 1. The AGR change of the development level of professional foreign language communication skills.

The content of the developed academic discipline has been designed based on the following principles: integration, personality-oriented input information, content openness, contextual learning and modularity; on the basis of qualification characteristics and job descriptions of the respective specialties, as well as the State educational standard of higher education in the specialty and the syllabi of specific disciplines.

Herewith, in the course of experimental study was theoretically justified and empirically confirmed the effectiveness of information and methodological support of blended learning of engineering students. The students increased the level of training motivation, degree of academic autonomy, developed information readiness to use new learning tools. Consequently, integrating the information and methodological support with the blended learning technologies is pedagogically appropriate and encourages optimizing the learning process and its computerization.

Organization of the educational process in a blended learning system contributes to creating favorable conditions for the holistic development of the individuals, their abilities and qualities, including professionally significant, due to:

- specific interaction of subjects of training
- ability of a student to work with the information independently
- creation and maintenance of the positive emotional environment during training activities
- organization of the guided, corrected and assessed independent work of the student (Matukhin & Gorkaltseva, 2015)

Herewith, the quality of education can be improved if the following conditions are met:

- organize the effective interaction of an instructor and a student at all stages of the learning process, as planning, creation of conditions, training, assessment and correction require the collaboration of the instructor and the student
- pay special attention to the development and maintenance of students' sustainable motivation and mastering reflection skills, as reflexive activity allows the student to analyze the course of academic activity and its results, and the presence of an incentive is a prerequisite for effective education

- provide independent educational and cognitive activity of students, since in the frame of the modern educational technology self-study plays a large part in the learning process (Valiathan, 2002).

3. Conclusion

As a result of theoretical and practical study it has been found that the use of means of new information technologies contributes to the humanization of the educational process, allows implementing in practice the idea of student-centered learning. One of the promising applications of the information technology is blended learning. Blended learning technology integrates the traditional learning tools with the means of new information technologies (Desmet, 2011). The use of new information technology tools is a necessity, conditioned, on the one hand, by scientific and technological progress, on the other hand – the society needs. Application of blended learning provides individualization and differentiation of the learning process, implementing the principles of clarity, adaptability and usability, ensures the objectivity of knowledge evaluation. The choice of teaching aids should be educationally and economically feasible, as well as methodologically provided; in addition, for the implementation of high educational potential of electronic resources they need to be systematically applied. Taken as a whole these conditions can help achieve the academic goals set for the educators of the higher education institutions.

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