Цифровые образовательные среды и цифровые ресурсы в образовании / Digital Educational Environments and Digital Resources in Education

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Electronic information and educational environment in the context of studying a foreign language (on the example of future specialists in information technology sphere)

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Abstract

Background. The digital space development in education can be seen as an integral part of person's life and professional context. Modern employers prefer specialists who have communication skills in English and are highly motivated to realize their potential in the professional field, especially information technology. The relevance and feasibility of using an electronic information and educational environment in the study of a foreign language in the context of professional development is dictated by the necessity of education to improve the effectiveness of training. So, electronic information and educational space can contribute to developing independent research activities skills, a research-based approach to learning, and critical thinking forming, which is especially valuable for IT specialists.

Purpose. The subjective of proposed study is to describe a role of electronic information and educational space in the process of Foreign language learning in its effectiveness using the example of future specialists in the sphere of information technology.

Materials and methods. The solution to the stated goal required an analysis of information on the possibility of an electronic information and educational environment application in the process of foreign language learning. The experience of creating Moodle platform of Sevastopol State university was described as an element of the digital educational environment.

Results. Analysis of the results of an electronic information and educational environment realization at the university during professional training was presented. Diagnostic data showed that a motivation level for learning, mastering English language, and

students' information and communication technology (ICT) skills has increased significantly. The authors noted that positive experience was gained in implementing digital space in the study of a foreign language by bachelor degree students-future programmers. It is concluded that information and educational support simulates the practical activities of future IT specialists, increase their motivation to study Foreign language, ensure a personally oriented approach, and achieve the necessary level of ICT skills.

Keywords: professional qualification; educational environment; IT subjects; Moodle; English language; systematic approach; psychological and emotional development; psychological adaptation; information and communication technologies skills

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Электронное информационно-образовательное пространство в условиях изучения иностранного языка (на примере будущих специалистов сферы информационных технологий)

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Аннотация

Обоснование. Развитие цифрового пространства в высшем образовании рассматривается как неотъемлемая часть жизненного и профессионального контекста личности. Современные работодатели отдают предпочтение специалистам, владеющими навыками коммуникации на английском языке и имеющими повышенную мотивацию к самореализации своих возможностей в профессиональной сфере, в особенности, информационных технологий. Актуальность и целесообразность применения в условиях профессионального становления электронной информационно-образовательной среды (ЭИОС) в процессе изучения иностранного языка вызвана потребностями высшего образования в повышении эффективности обучения, что может способствовать развитию навыков самостоятельной исследовательской деятельности, научно обоснованного подхода к получению знаний и формированию критического мышления, что особенно ценно для IT-специалистов.

Целью исследования является описание роли реализации ЭИОС при изучении иностранного языка в процессе профессиональной подготовки (на примере будущих специалистов сферы информационных технологий).

Материалы и методы. Решение выдвинутой цели потребовало проведения анализа научной литературы о возможности реализации ЭИОС в условиях изучения иноязычного языка. Описан опыт создания Платформы Moodle как элемента цифровой образовательной среды в Севастопольском государственном университете.

Результаты. Проведённый анализ результатов реализации ЭИОС в процессе профессиональной подготовки показал, что уровень мотивации к освоению английского языка и навыков владения информационно-коммуникационными технологиями (ИКТ) у студентов значительно повысился. Авторами отмечено, что получен положительный опыт реализации цифрового пространства при изучении иностранного языка бакалаврами-будущими программистами. Сделан вывод, что информационно-образовательная поддержка моделирует практическую деятельность будущих IT-специалистов, способствует повышению мотивации к изучению иностранного языка, обеспечивает личностно-ориентированный подход и достижение необходимого уровня ИКТ-навыков.

Ключевые слова: профессиональная квалификация; образовательная среда; Moodle; английский язык; системный подход; психологическое и эмоциональное развитие; психологическая адаптация; навыки работы с информационно-коммуникационными технологиями

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Introduction

The digital space development in education can be seen as an integral part of person's life and professional context, as modern employers focus on a qualified personality with information and computer technologies skills as well as foreign language ones. The popularity of electronic information and educational environment (EIEE) in the condition of English learning can be determined in the context of professional development at a university. The priority for improving education quality is significant in today's realities and can be considered as interactive methods realization by means of EIEE [25].

The relevance of the study is in the feasibility of using EIEE in the condition of English learning as it provides comprehensive support for train-

ing at a higher school. Currently, there are "two opposing tendencies of development of distance education in universities: extension of the scope of distance learning courses; the development of digitalization of traditional educational programs" [21, p. 385].

There are some benefits of using EIEE application in the university, including "enhanced study efficiency, personalised learning support, and the potential of AI to level the academic playing field for students with diverse needs" [26, p. 672].

The role of artificial intelligence in education has increased recently. A demand for its practical technologies is due to advances in domains of data science and machine learning [7]. EIEE is associated with the implementation of distance learning technologies including specific teaching, education, and development functions and ensuring the socialization of students in the interests of the individual, society, and the nation. It is not solely focused on achieving these functions; it also facilitates the achievement of other goals [24].

Purpose. The subjective of proposed study is to describe a role of electronic information and educational space in the process of Foreign language learning in its effectiveness using the example of future specialists in the sphere of information technology.

Sevastopol State University was the basis of the study.

The following research objectives are:

1) as the idea of introducing new environment into practical classes in a foreign language has become widely used by methodologists all over the world, one should analyze this problem in the context of professional becoming;

2) to describe students' results after training by means of EIEE in the condition of Foreign language learning.

Materials and methods

The study is based on a systematic approach which provides considering EIEE as a system. The principle of consistency in the educational environment was studied by O. S. Koshevoy (2012) [5], V. Bhaskar, Prof. Lajwanti (2019) [11], L. F. Carter (1969) [13], M. Suvarchala Rani (2016) [27], J. Lim, J.C. Richardson (2016) [23], I. Golitsyna (2017) [17],

J. Lee, C. J. Bonk (2016) [22]. Improving digital pedagogy competence is analyzed by A. Bentri, and A. Hidayati (2023) [10].

Ruijia Zuo, Wenling Li , Xuemei Zhang addmited the role of Information and Communication Technology (ICT) in fostering students' learning and development [29, p. 1].

M. Borba, A. Chiari, H. Almeida (2018) showed how digital technologies affect "teaching distance learning courses" [12, p. 269].

C. Gao, F. Wang, J.H. Danovitch (2024) demonstrated in their research that person's "recall and recognition task scores improved when learning took place using the touchscreen or face-to-face interaction" [16, p. 105961].

V. Kareva proved that "comprehension and hence learning is more successful with printed sources" [19, p. 65].

In general, the results of a theoretical analysis of scientific sources on the problem of implementing an electronic environment have shown that "EIEE focus on creating the integrity of pedagogical conditions for solving the problems of students' training, upbringing and development" [9, p. 56].

The role of Foreign language for professional communications was considered by M. Kostić-Bobanović, M. Bobanović [20]. V. Vaiciuniene and P. Gedvilas said that English language skills and ICT proficiency of students should be acquired in order to be good professionals [28]. Scientists admitted benefits of EIEE realization in professional becoming.

But at the same time there are some barriers connected with EIEE [9]. The researchers pay an attention to the issues of its content, and the management system [4]. The disadvantage of realization of EIEE in the condition of English learning is the potential technical difficulties: outdated or nonexistent equipment, an inability to use new programs – all of this can become an obstacle on the path to a new language.

The "advantages are in contrast with students' perceptions of a wide range of significant concerns and challenges, notably the ethical dilemmas surrounding academic honesty, the potential for student dependency on AI leading to diminished knowledge and skill development, as well as the issue of equity in relation to students' access to AI resources" [14, p. 1].

The pedagogical experiment was conducted during 2023-2024, in which 150 students of IT training programs took part. We carried out a survey, con-

versation with educators and students about EIEE positive impact by means of the questionnaire methods. In general, 20 teachers of Sevastopol State university were involved in the study.

Results

EIEE provides many advantages to students and teachers compared to traditional teaching in the classroom [1]. Electronic resources application in foreign language classes increases students' cognitive activity and motivation, and ensures their independent activity. "However, there are conditions for the use of EIEE. If at least one of these conditions is not, then it is no longer possible to talk about the effectiveness of EIEE" [26, p. 672]. Learning a foreign language should be done in stages; the lack of technical resources for conducting lessons poses the problem of learning continuity. Furthermore, live communication with a teacher cannot replace technical resources. Another problem should be noted. The systems that verify the quality and reliability of assessments may be insufficiently sophisticated. In such cases, there is a high probability that the results will be unfairly deemed invalid. Students complained that they were being unjustifiably accused of cheating or receiving hints. There is a risk that, due to the other subjects overlearning, students do not complete all assignments and not always independently.

The main requirements for EIEE of higher education are "established in the federal project "Digital Educational environment" (DEE)" [9, p. 76]. that can "provide an opportunity to gain additional knowledge and skills, forming an educational marketplace…" [4, p. 83].

We do not try to describe the advantages of the Moodle platform in English teaching. There is no doubt that Foreign language teachers significantly simplify the process of communication between students by using EIEE, as they have the opportunity to communicate via video, as close as possible to one in real-life conditions.

Our task is to show EIEE role in English learning by students of bachelor's degree in IT specialties. EIEE provides an opportunity to follow of students' achievements (grades for control and in general for the subject); conducting surveys and questionnaires, etc. [3, 8]. It gives lecturers an op-

portunity "to evaluate learning outcomes; increase students' motivation to acquire knowledge, interest them in learning foreign languages, and foster one's interest in a desire for self-control and self-improvement" [2, p. 75].

Summarizing the information obtained during the study of the data, we can note that there were some disadvantages of EIEE realization in the context of Foreign language education. Some technological means were oriented only to simulate communication by computer programs [7]. The lecturer needs to clearly understand the feasibility of EIEE at a certain stage of training, all the positive and negative aspects of this technology implementation.

Adopted recommendations of Teaching Information Technology Conference would be useful in order to improve the quality of professional training as well as to promote mastering Foreign language communication skills, including intercultural ones. According to the scientists, IT subjects are to be studied during 1-2 courses, and humanitarian and general education subjects are to be assigned to the 3rd-4th courses.

Received experience has shown that students are unable to engage in professional conversations because they lack knowledge of IT subjects. This impedes communication and the acquisition of new vocabulary in English.

Despite the shortcomings using EIEE, our experimental study confirms its effectiveness during English classes in terms of training IT specialists. Modern teaching methods allow to simulate students' practical activities, increase their motivation for learning, ensure a personally oriented approach, and achieve the necessary level of professional independence and proper self-affirmation.

Interactive tasks engaged students in a Foreign language environment and facilitated the acquisition of new material, which they studied with a great interest.

In order to describe students' results after training by means of EIEE in the condition of Foreign language learning we have conducted a pedagogical experiment, in which students of IT training programs of Sevastopol State university participated. Questionnaire methods, survey and observations were used during our research.

We know that greater assurance can be provided by a higher confidence level, such as 99%, which is possible due to a larger sample size. We believe that 150 respondents will be a sufficient sample to evaluate the effectiveness of EIEE Moodle.

We want to make sure that our study can specify the appropriate percentage of respondents. The confidence level we select determines how confident we can be that our "sample results will reflect the true population parameter (a de facto standard is to shoot for 95% confidence)" [15, p. 3].

The representative sample sizes use formula (1) [15, p. 3]. The sample is random. "Margin of error (the radius of the confidence interval, or the precision) of the share of EIEE users among teachers and students should not exceed 7%" [26, p. 674]; a 5% (0.05) margin of error is acceptable [15].

$$n = \frac{N \cdot t^2 \cdot w(1-w)}{\Delta_p^2 \cdot N + t^2 \cdot w(1-w)} \quad (1)$$

Where: N = Sample size; it is the number of respondents, t is the confidence level, which is 2.0 at P(probability)=0.954 (2). Desired confidence level (1.645 corresponds with the typical 90% confidence level, 1.96 - 95%, 2.576 - 99%) [26, p. 674];

$$n = \frac{150x2x2x0.5(1-0,5)}{0.05x0.05x150+2x2x0.5\,(1-0.5)}$$

$$n=158$$

The actual number of respondents was 150 students and 20 teachers. That indicates the representativeness of the samples.

Our experiment was realized during three stages in order to prove EIEE effectiveness for organizing students' study: diagnostic; realization EIEE by the educators of Foreign language department and the final stage.

Before coronavirus pandemic started, Moodle learning management system was introduced into EIEE of Sevastopol State university as an innovative promising environment to improve the quality of education.

Moodle as a digital tool of EIEE is free web application for organizing online training. The diagnostic stage was conducted during 2023 year in Sevastopol State university. In oder to determine students' initial level of Foreign language skills the "Diagnostic Evaluative Test" was written.

Additionally, a diagnosis of motivation for English learning was carried out by means of questionnaire methods. Assessing ICT skills (access, integration, evaluation, document creation, transfer, definition) of future IT specialists was conducted.

However, the diagnostic results of evaluating the effectiveness of EIEE Moodle demonstrated a low level of formed students' English and ICT skills, and motivation for learning (table 1) because complex psychological adaptation to new medium of study and a lack of technical means [3].

Table 1.

Moodle effectiveness evaluation (in %)

Level	Motivation	Language skills	ICT skills
low	68	70	72
middle	24	20	18
high	8	10	10

The second stage comprised EIEE realization by the educators of Foreign language department during 2023-2024 years. The Moodle system provided students with educational materials. Lectures were combined with interactive tasks. Tests were required after each topic. Videos with subsequent assignments were offered. In addition, tables and diagrams are provided for visual perception of new material.

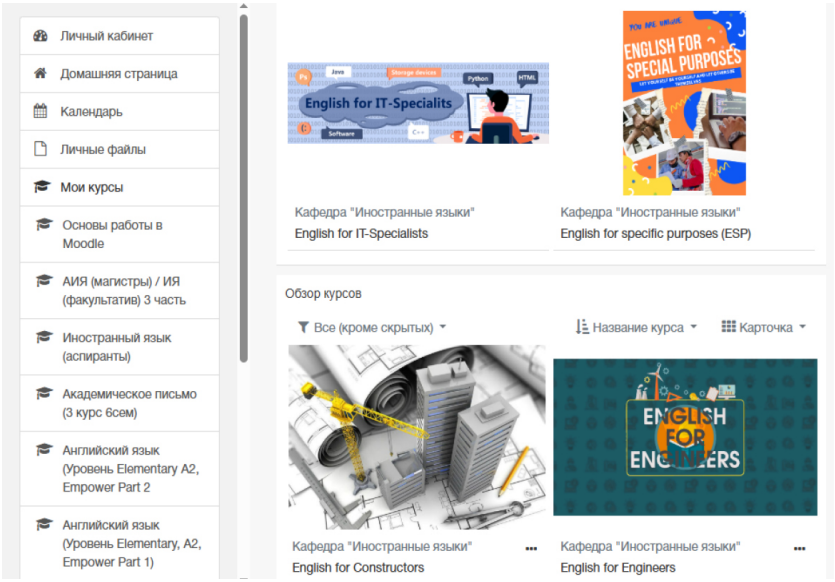

Fig. 1. Teacher's personal account in the MOODLE system of university

The lecturers had a possibility to communicate with students in chats due to a personal account in EIEE (see fig 1, 2), as well as define the results of mastering a course of the English subject.

Fig. 2. Subjects' curricula and content

EIEE realization gave the possibility to update electronic resources, "infrastructure, technical support, telecommunications facilities, and regulatory framework" [9, p. 66]; ensure a quality of students' training [18]. Access was provided to authorized users.

We provided a systematic approach to English learning – an integration process from the general to the particular subject [9]. Students' and lecturers' personal accounts were integrated with the university's automated information system to support the educational process.

After the year of Moodle learning system realization the final stage of our experiment was conducted to test EIEE effectiveness.

The changes in the levels of motivation, English and ICT proficiency of students were determined (table 2).

Students have appreciated the importance of information educational technologies and admitted the effectiveness of work in the EIEE. The data obtained as part of the diagnostics are presented in the diagrams 1.

Table 2.

The evaluation of Moodle effectiveness (in %)

Level	Motivation	Language skills	ICT skills
Low	2	18	5
middle	20	23	10
high	78	59	85

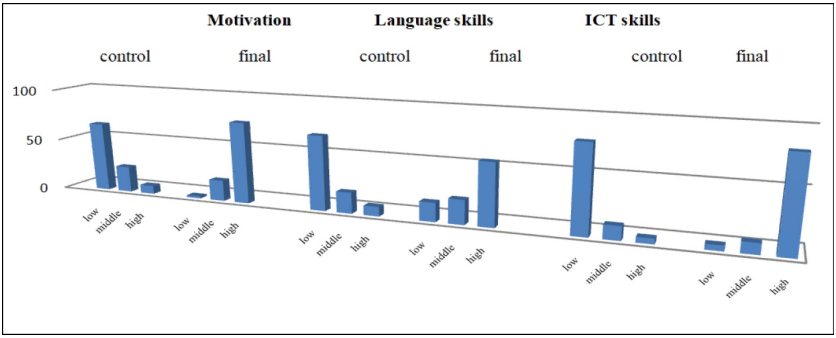

Diagram 1. Changes in the levels of ICT proficiency, motivation, language skills formation

An important characteristic of the information and educational environment is its focus on creating the integrity of pedagogical conditions for solving the problems of teaching, upbringing and development of students.

EIEE realization for training IT specialists provided new opportunities to the educational process. Personal accounts included an electronic portfolio formation, as well as access to the results of educational activities.

It is clear that the high level of motivation, mastering English skills and ICT skills has increased considerably. Specific characteristics of teaching methods in the context of EIEE are the subjective students' positions, focus on obtaining individual educational results, reflexivity, communication and interest to study.

Only a few participants had low marks in English tests because of failure of computer technology knowledge, lack of technical means at home.

Conclusion

EIEE realization allows to simulate the practical activities of future IT specialists, increase their motivation for learning, ensure a personally oriented ap-

proach, and achieve the necessary level of ICT and Foreign language skills. During the pedagogical experiment, the efficiency of using EIEE system was presented. The following conclusions can be drawn based on the results obtained:

1. The results would have been much better if all the shortcomings of the implementation of the electronic environment were taken into account. It is important to assess all the risks organizing the educational process in EIEE that can decrease the results of study.

2. The implemented EIEE was proved to be effective in providing its main task – an educational environment creation. An appropriate material and technical base has been developed; management is based on the use of modern technologies.

3. In our opinion, EIEE was variable; all students had the opportunity to form their own individual educational trajectory in mastering ICT skills, having motivation and learning Foreign language. EIEE provided organizing and adjusting the independent work of students.

The prospects for further research may include issues of eliminating the shortcomings of the electronic environment to meet the requirements of educational standards in various areas of future specialists' training.

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