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## **DEVELOPMENT OF A HYBRID WEB-EDUCATION PLATFORM FOR ONLINE LEARNING**

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Development of a Hybrid Web-Education Platform for Online Learning

In this work was developed a hybrid platform of real-time online learning based on the virtual model of the University, distributed to all participants in the educational process and the pedagogical principle of learning “everything and everywhere”. The platform involves distributed testing technology with the ability to take into account both the emotional state of students and the implementation of psychological and pedagogical influences in the learning process.

*Key words:* hybrid platform, online learning, mixed learning, electronic university, electronic journal.

**1. Formulation of the problem.** Worldwide e-learning industry according to the most modest estimates, is estimated at more than € 38 billion. Today, more than 3.5 million students take part in online education only in US universities. In a number of survey-based studies, it has been shown that students are generally satisfied with both online activities and traditional ones[1;2].

Therefore, e-Learning, as a system based on virtual structures and web technologies, opens up a wide area for online learning and other remote methods and thus provides the basis for creating a global educational space.

This led to the development of a large number of different online learning platforms, distance learning systems and others which are intended for both universal and specialized use, for specific areas [2 – 4].

However, these platforms do not fully realize the current capabilities of technical training tools for students and instructors. They were generally developed without taking into account the pedagogical requirements for the didactic process and the psychological and physiological characteristics of students, etc.

Thus, there is a problem related to the development of e-Learning platforms (systems) based on virtual structures and web technologies for real-time online learning. This makes it relevant to conduct research in this direction.

**2. Analysis of recent research and publications.** The modern educational process is characterized by the active use of information technology of education, hardware and software Internet, and this trend in education is rapidly increasing. In the article [5], the Academician Vasyl Kremen argued: “It is likely that the new computer technologies will be next to the new psychology, the new ethics and the new pedagogy that still need to be developed, and humanism remains” [5, p. 8]. Based on this, let us consider directions and online learning platforms that most fully characterize the problem under study.

In the mid-2000s, a new revolutionary direction appeared in education. It was open online learning that was developed by Salman Khan in 2006. He created an international educational network “Khan Academy” ([www.khanacademy.org](http://www.khanacademy.org)), where all educational materials (lectures, tutorials, tests, etc.) in 65 languages are presented as video clips in YouTube format and are available for free. The user can track progress in training, statistics of study, and more.

However, the educational network (platform) "Khan Academy" does not take into account the psychological and physiological characteristics of students, there is no feedback with the teacher, the platform does not work in real time, and so on. All this greatly reduces the didactic capabilities of the developed platform.

Harvard University and the Massachusetts Institute of Technology have jointly developed the EdX platform (<https://www.edx.org>), which works in 24 areas of free training. The platform was created on the basis of a modular approach that allows

placement of training courses of other universities, crediting them for obtaining loans, and so on.

Another Coursera platform (<https://www.coursera.org>) was founded in 2012 by two professors: Daphne Koller and Andrew Ng of Stanford Faculty of Computer Science who wanted to share their knowledge and skills with the world.

The Coursera platform allows the student: 1) to view detailed information about the teacher; 2) to learn about the recommended methodological literature available online; 3) to preview the courses that will begin soon; 4) to enroll in practical classes; 5) to pass modules of the training course, which are limited in time; 6) to pass current control, and so on.

The expansion of computer science student training at Stanford University has led to the creation of a specialized Udacity platform (<https://www.udacity.com>) that focuses on education in programming, data analysis, machine learning, and more.

The number of courses in the Udacity platform is small and includes several dozen courses. All training courses are divided according to the level of complexity: beginner, intermediate, advanced. The educational material is presented in the form of "traditional" video with the voice of the lecturer's commentary. In the learning process, students must complete various tests, answer questions, and more.

Also the Ukrainian Prometheus platform ([www.prometheus.org.ua](http://www.prometheus.org.ua)) is known, which was developed as a public project of massive open online courses. This platform works in two formats: 1) massive open online courses; 2) mixed education.

Massive open online courses consist of "traditional" video collections, interactive tasks, as well as a forum on which students and faculty can communicate. Mixed education involves the integration of online learning in the educational process of universities and schools. The Prometheus platform offers a small number of free online massive courses (about 35 courses) from the best teachers of leading Ukrainian and world universities, top companies and organizations.

The platforms and other e-learning systems discussed above [1 – 4] are effective modern teaching methods for optimizing and supporting the learning process, which allow for the development of individual learning strategies for

students, to form their professionally-oriented skills, to organize their own work, to simulate communication with a teacher, and much more.

But these platforms (systems) do not allow real-time online education and psychological and pedagogical interaction of a teacher with students, do not take into account the psychological and emotional state of students, etc.[6; 7].

In addition, there are a number of software and web services on the Internet, such as: Adobe Acrobat Connect Pro, Arkadin, BeamYourScreen, Mikogo, Skype, various web-forums, means of conducting webinars, social networks, etc., used as components or e-learning systems[1; 3]. It should be noted that the didactic capabilities of such software means and systems are significantly limited by their narrow specializations, complexity of use, high cost, and so on. In spite of this, some of them are actively used in conducting training (online lectures), such as Skype, and have shown their effectiveness, despite the significant didactic constraints when used in the educational process.

Thus, the analysis of the use of information technology in education for the realization of online learning in real time has shown that today a large variety of platforms and e-learning systems has been developed, software and web services in the Internet, which allow for the implementation of different approaches to online learning and are effective modern teaching and learning tools.

However, these platforms (systems) do not allow full realization of online learning in real time, provide psychological and pedagogical interaction of the teacher with students, do not take into account the psychological and emotional state of students, etc., which significantly limits their didactic capabilities. This indicates the relevance of conducting research in this direction.

**3. Formulating the purposes of the article.** The purpose of the work is to develop a hybrid platform of online learning with the possibility of providing psychological and pedagogical real time teacher-student interaction.

The concept of the development of the platform is based on: 1) the use of a hybrid approach to the implementation of psychological and pedagogical teacher-student interaction; 2) a virtual model of an educational institution (university); 3) educational web-technologies and services of the Internet network; 4) a modular

approach to building a real-time online-based hybrid platform; 5) a pedagogical principle of learning "everything and everywhere".

#### **4. Presentation of the main research material.**

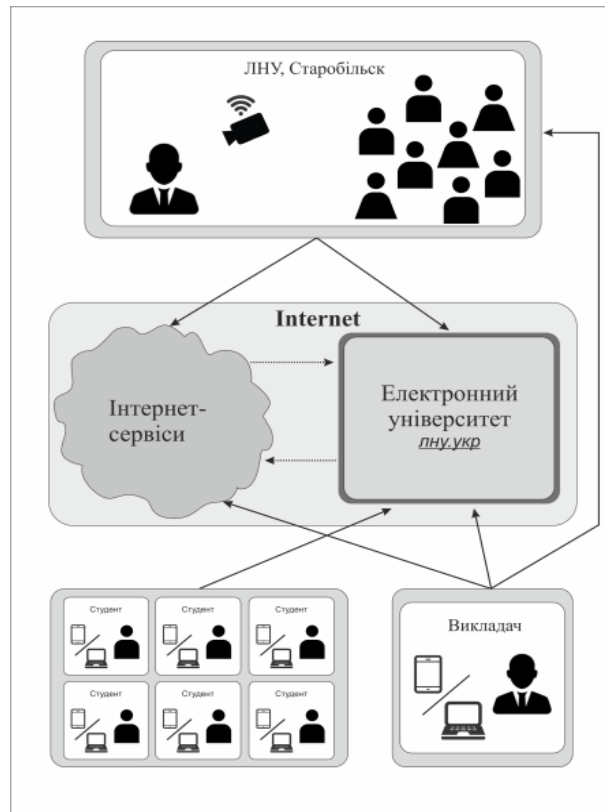
The works [8 – 10] show that the main basic type of architecture of modern intellectual, expert and training is distributed hybrid systems, which use "client-server" technology and distributed knowledge in the Internet, which substantially expands their didactic opportunities.

Based on this approach, the Information Technologies Center of Luhansk Taras Shevchenko National University developed its own online-learning hybrid platform "Electronic University".

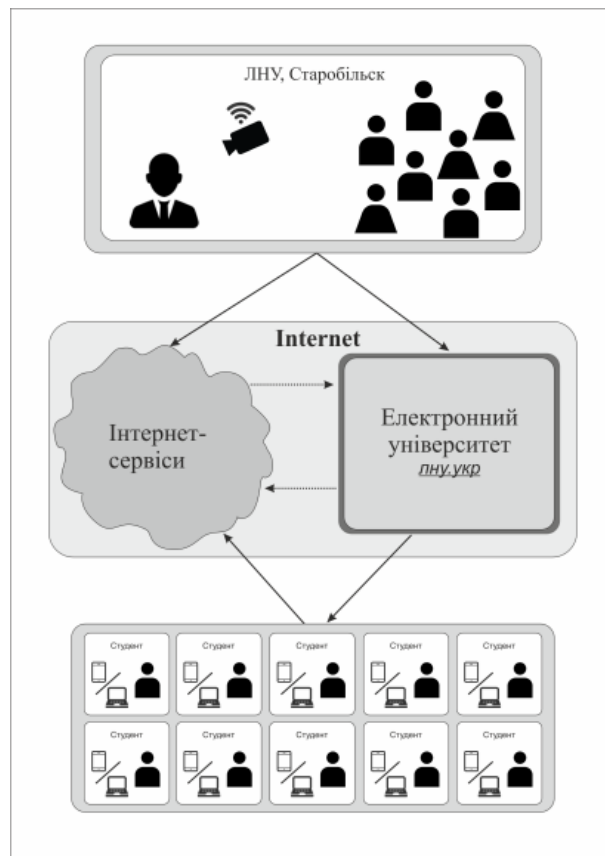
The platform is based on: 1) the modular approach to building a system structure; 2) client-server technologies and educational web-services of the Internet network; 3) the virtual model of the university (e-Rooms, etc.); 4) the distributed location in the cyberspace of all participants in the educational process (students, teachers); 5) the maximize use of software and hardware, and educational web-services of the Internet (computers, mobile phones, tablets, laptops, etc.); 6) the new principle of learning "everything and everywhere". The generalized structure of the real-time online learning platform "Electronic University" is shown on Pict. 1.

The online learning platform "Electronic University" works in three main (basic) modes, which are related to the peculiarities of using the client part of the software: 1) the mixed learning mode; 2) the direct addressing mode; 3) the indirect addressing mode.

The mixed learning mode (Pict. 2) allows online learning to be conducted simultaneously both for students in the classroom and anywhere where students can connect to the Internet using computers, mobile phones, tablets, laptops and others. In this mode, the teacher should be with the students in the classroom (see Pict. 2).

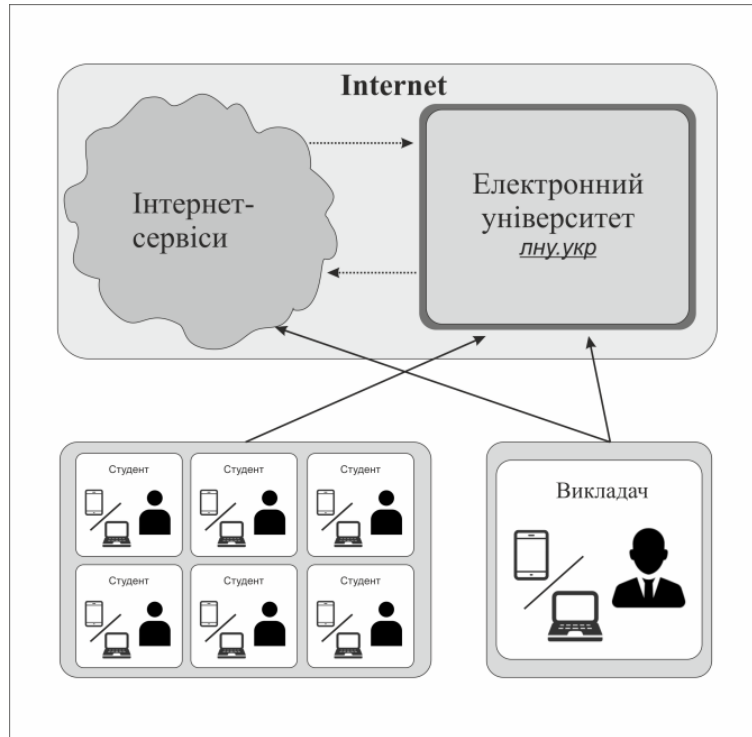


Pict. 1. The generalized structure of the online learning platform “Electronic University”.



Pict. 2. The example of the generalized structure of the online learning platform “Electronic University” in the mixed learning mode.

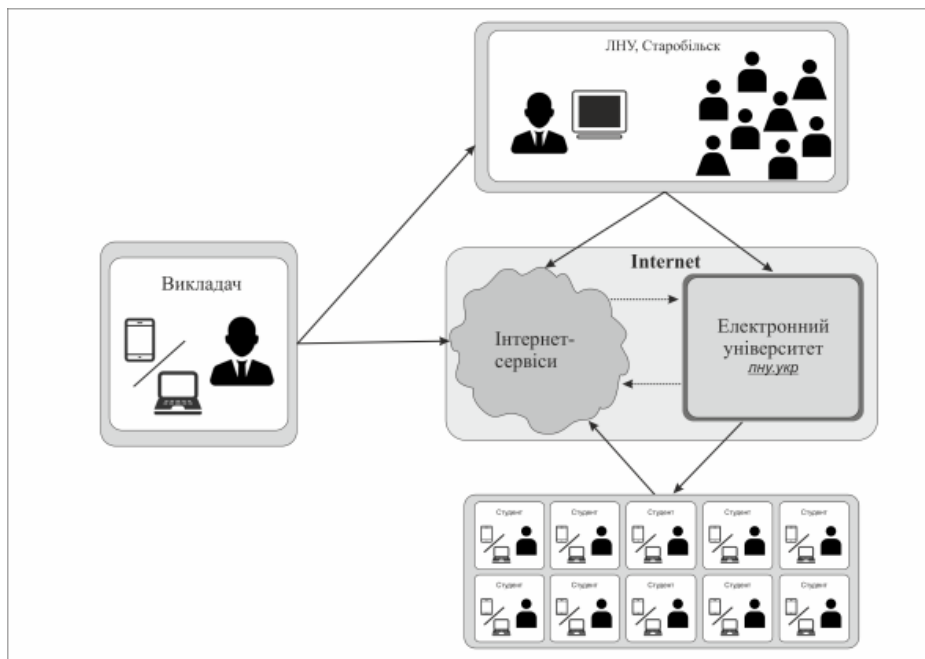
The direct addressing mode (Pict. 3) implements the pedagogical principle of learning “everything and everywhere”. This mode allows the teacher and students to stay in place, independently of each other. The feature of this mode is the need to install and configure on the teacher's computer an additional special client program.



Pict. 3. The example of the generalized structure of the online learning platform “Electronic University” in the direct addressing mode.

The indirect addressing mode (Pict. 4). This mode does not require installation and configuration of an additional special client program on the teacher's computer, the teacher can use any software, for example: Skype, Facebook Live, and more. But the teacher needs to connect to the “E-University” through the servers (web-services) in the place of the university location.

This allows to reduce the requirements for software and hardware (computers, tablets, etc.) that can be used for online learning in real time.



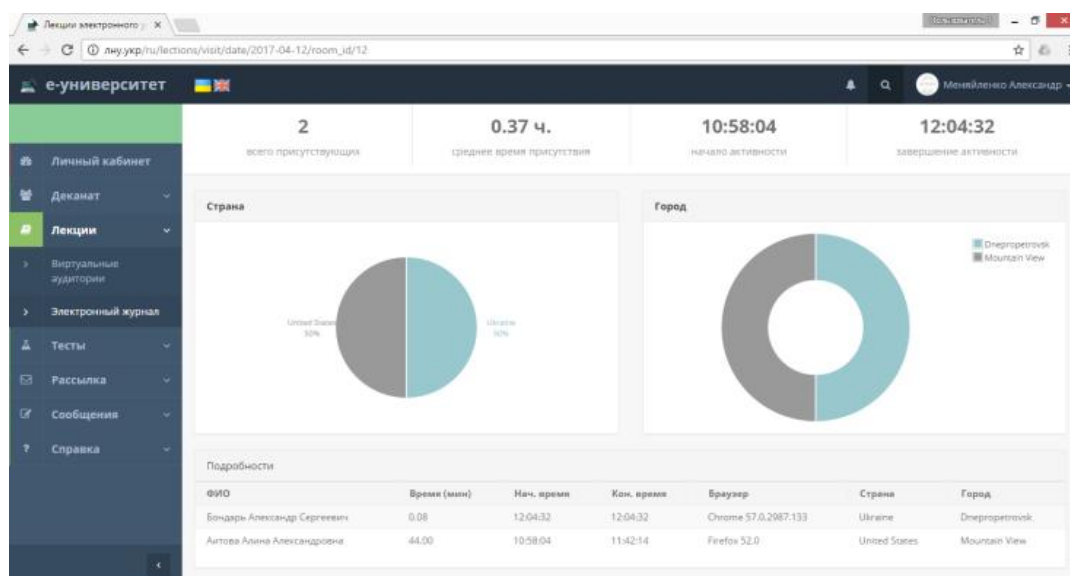
Pict. 4. The example of the generalized structure of the online learning platform “Electronic University” in the indirect addressing mode

Besides technical means (computers, tablets, mobile phones, etc.), students should have a web browser, register on the platform of the "Electronic University" and enter the e-Room.

In addition, the online learning platform "Electronic University" in its composition also has a subsystem of creating test teachers, through which implemented distributed testing technology, with the ability to take into account both the emotional state of students and the implementation of psychological and pedagogical influences in the learning process. This is provided through feedback from the teacher and students.

Also, the online learning platform “Electronic University” maintains an online journal of students’ visits in real time (Pict. 5), which allows the teacher during the online learning to control the presence of students and ensure the interaction between students and the teacher.





Pict. 5. The example of the electronic journal of students' visits of the platform "Electronic University" in real-time

The platform is a research development and is currently in the test mode. Today it is used in the system of pre-university preparation in teaching computer science for students who are not able to constantly come to the university (mixed learning mode) (see Pict. 2).

It should also be noted that the quality of the online learning platform "Electronic University" can significantly depend on the state of the Ukrainian component of the Internet and the technical means used (microphone, web-cameras, computers, mobile phones, etc.).

## Conclusions

1. Based on the analysis of the use of information technology in education for real-time online learning, it has been established that today there is a large variety of platforms and e-learning systems, software tools and web services in the Internet that allow implement different didactic approaches to online learning and are effective modern teaching methods for optimizing and supporting the learning process.

2. It is shown that these platforms (systems) do not allow full realization of online learning in real time and psycho-pedagogical interaction of the teacher with students, do not take into account the psychological and emotional state of students

and so on. This significantly limits the didactic capabilities of such software and systems.

3. The online learning hybrid platform “Electronic University” was developed using client-server technologies and educational web-services of the Internet network, based on the virtual model of the university, distributed to the location of all participants in the educational process of the university (students, teachers) in the cyberspace and the pedagogical principle of learning "everything and everywhere". The work of the system is verified in the conditions of the real educational process.

4. A promising direction for further research is the creation and use of artificial intelligence systems in online learning in real time.

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Меняйленко О. С., Бондар О. С., Кондратенко Є. В., Краснопольський В. Е., Фоменко М. М., Шевчук О. Б.

Розробка гібридної web-освітньої платформи online-навчання

У роботі представлено розроблену гібридну платформу online-навчання у реальному часі, що базується на віртуальній моделі університету, розподіленому розташуванню всіх учасників освітнього процесу та педагогічному принципі навчання «все і звідусіль». Платформа включає

технологію розподіленого тестування, з можливістю врахування як емоційного стану тих, хто навчається, та реалізації психолого-педагогічних впливів у процесі навчання.

*Ключові слова:* гібридна платформа, online-навчання, змішане навчання, електронний університет, електронний журнал.

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Разработка гибридной web-образовательной платформы online-обучения

В работе представлена разработанная гибридная платформа online-обучения в реальном времени, основанная на виртуальной модели университета, распределенному расположению всех участников образовательного процесса и педагогическом принципе обучения «все и отовсюду». Платформа включает технологию распределенного тестирования, с возможностью учета как эмоционального состояния обучающихся, и реализации психолого-педагогических воздействий в процессе обучения.

*Ключевые слова:* гибридная платформа, online-обучение, смешанное обучение, электронный университет, электронный журнал.

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