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**A systematic approach to modern trends in e-learning as a basis for the development of e-learning and information security**

*The main directions of development of e-learning (distance) education in the classical university are considered in the article on the example of the Kharkiv National University named after V.N. Karazin, taking into account the basic trends of modern education. At the same time, university system of e-learning is defined as a complex structured system, levels of which interact and determine each other. The trends of modern education that affect the formation of the university information and educational environment are considered: informatization, integration and internationalization through the prism of mixed learning.*

**Keywords:** *e-learning, informatization, integration, mixed learning, mixed teaching models, information-educational environment, learning management system (LMS), information security.*

The development of e-learning in the modern world, an ever-expanding range of innovative teaching trends, formed as a form of high efficiency and quality training, require a careful analysis of the reality of the educational space in a higher educational institution, including to ensure the information security of the electronic educational space. This, in turn, obliges to consider the educational space of the university as a

system that includes the whole variety of e-learning. Taking into account these aspects allows for the effective design of a distance learning system in a classical university.

The article analyzes the experience of using existing trends in the system of innovative education on the example of the development of electronic (distance) education in a classical university on the example of the V.N. Karazin Kharkiv National University. At the same time, the starting points of the analysis are the fact of intensive development of e-learning at the university in recent years and the fact that the university system of e-learning is defined as a complex structured system, the levels and forms of which interact and condition each other, as well as trends - complement each other, creating an effect of system quality, which includes elements of information security. Analysis of the identified aspects of the problem of improving the educational process in the world on the basis of modern information technologies demonstrates a wide layer of positions and approaches, which are reflected in the works of Ukrainian, Russian and foreign authors: A. Bryzgalina, Y. Zuban, V. Kauka, V. Kukharenko, N. Kireeva, M. Levin, M. Mazur, A. Ursula, A. Grabarnik, N. Sirotenko, K. Bugaychuk, M. Karpenko, E. Polat, R. Bell, D. Keegan, J. Koumli, K. Lonka, D. Tapscott, D. Oblinger, G. Small and others. Some generalization of the reviewed materials allows us to note the main trends in the development of modern education, which are directly related to the subject, directly intertwined with electronic distance learning. E-learning as a phenomenon in its current state is characterized by a systematic, structural complexity, multi-vector development. It is a systematic approach that allows immanently incorporating elements of information security into the existing system. The development of well-established blended learning, including all known basic forms of e-learning in unity with traditional forms of full-time and part-time forms of education, is supported and confirmed by the example of the OpenCourseWare programs, classical distance learning, WOOC, etc. emphasize the diversity of the e-learning system in the modern world and its integrity. Past attempts to absolutize one of the forms of education that have emerged in the development of electronic

educational environments. In our opinion, considering these trends and directions of development of modern e-learning, we should talk about the creation and maintenance of information and educational environments, including the development and dissemination of modern methods, means and technologies of education, open, distance, blended learning, based on the integrity educational process, systemicity of the whole e-learning system.

It should be borne in mind that the modern process of studying at a university, as in any other higher educational institution, has a number of characteristic features of development. These include: the integration of scientific knowledge, the growing number of interdisciplinary problems and areas; the complexity of the problems in modern science and socio-economic practice, the need to study them in the unity of technical, economic, social, psychological, managerial and other aspects; the complexity of the learning process itself and the increasing role of innovative components, with the increasing number of links between innovative and traditional learning components; increasing the dynamism of changes in the learning process; the constant contradiction between the created innovative learning resources and the resources of the classical forms of education; the growing need for a digital learning environment and management of the educational process at the university; globalization of competition in the educational environment, in the network of available educational and information resources. These features cause the inevitability of a systematic approach, because, in our opinion, only on its basis can we ensure the high quality of the educational process in a modern university, ensuring information security. And the other side of this process, a classical university, in its structure meets the basic requirements of modern educational trends. Having 22 faculties and scientific and educational institutes, the university inevitably produces integration links, interdisciplinary systems and complexes.

The e-learning system in a modern classical university is formed by two interrelated components. First, the external environment in which the system is

incorporated. In our case, we are dealing with the Internet, which includes educational resources, educational structures integrated into the Internet and open for interaction, government and public organizations related to the educational process. It is here that the input and output of the system, communication with the external environment and mandatory feedback. This is where the first level of information security is formed.

Secondly, the internal structure of the university, i.e. a set of interrelated components that provide the educational process. At the university, these are scientific and educational schools, educational and cultural traditions, research and production structures integrated into the learning process in order to achieve the main goal - quality training of specialists necessary for the society. For us it was the main thing to form such an internal structure that would be as much as possible integrated into the external one and use all the possibilities of the external e-learning environment. At the same time, this internal structure should be integrated as much as possible into the traditional structure of university education.

In the formation of the e-learning system of the university, we chose two key structural points. Peculiar points of bifurcation, which allowed to change the existing structure of the relationship of educational forms, pedagogical methods, traditions and ways of teaching on the whole variety of university specialties. The first is blended learning. A well-known trend in the world of e-learning, fully described in the world and national literature. [2,3]. One of the solutions to mitigate and, to a certain extent, stop acute forms of the positive and negative consequences of the information revolution is the implementation of the concept of blended learning as a process that provides for the creation of a comfortable educational information environment, a communication system representing all the necessary educational information. In this context, the information environment of a modern university is understood as a combination of traditional and innovative (electronic) forms of education with the constant increase of information and communication technologies (ICT) and electronic resources, as well as the continuous improvement of teaching methods and teachers'

professional knowledge. While experts in e-learning techniques broke spears and frightened with innovations of conservative teachers and professors, a model of using distance learning courses and other web resources was chosen at Karazin University, which was called: an effective tool for gaining knowledge and controlling the quality of learning (Model: Script and control). In this case, we used the well-known system of typing forms of blended learning, proposed by researchers at the University of British Columbia (Canada). The study is based on the experience of implementing e-learning in Europe, USA, Canada and identifies 6 models of blended learning [5]: 1) a model in which network-based learning is complementary to the main one and provides access to electronic materials in a computer class, laboratory, at home (Model 1: face-to-face Driver) 2) a model in which, in accordance with the schedule, traditional and online learning supervised by teachers (Model 2: Rotation) 3) a model in which most of the training is carried out in electronic educational wednesday and that students are provided with the necessary in-person teacher support (Model 3: Flex) 4) a model in which training is conducted in an online laboratory accessible to students in a special class, students are supported by technical staff where the equipment is located and the teacher is online (Model 4 : Online lab) 5) a model in which students choose online courses as a supplement to the study of academic disciplines in full-time mode (Model 5: Self-blend) 6) a model in which students study in an electronic environment online, and certification pass very (Model 6: Online driver). Taking into account the experience of using education in the information-educational environment at Karazin University, we added another model in which students use an electronic resource as a basic algorithm of the Learning Management System (LMS) and an effective tool for learning and controlling the quality of learning (Model 7: Script and control).

The use of blended learning in the model of Karazin University (Script and control) allowed not only to enter the educational process into existing trends in the global educational space, namely, the widest use of information technologies and improving the cultural and professional level of the majority of the population through

development and dissemination of modern methods, means and technologies of education, but also to form such an internal structure of the educational process, which gave rise to ability to use synergistic effect in the university education system. It should be recalled that we define this system as a complex structured system, the levels of which interact and condition each other. The basis of such a system is the existing University Bank Web Resources, created on the basis of the Center for e-learning of the Institute of Postgraduate Education and correspondence (distance) training. The e-learning system of Karazin University includes the main core - the MOODLe platform and the use of separate teachers of the Google Classroom. But given that the organization of the educational process at the university is based on MOODLe, then we will continue to consider it as the basis of the system. Moreover, Google Classroom is mainly used for personal communication between individual teachers and students.

In the modern informational and educational environment of Karazin University, in the didactic projection, MOODLe can be described as: - information delivery is an electronic textbook, presentations, topics for forums, tests and coursework, a calendar plan for studying the discipline, criteria for evaluating completed tasks, references, announcements, links, including open educational resources; - communication - through the forum, email, chat; - organization of group (forum, wiki pages) and individual (file sharing) student work; - knowledge control through testing (test self-test, test exam). From the point of view of the organization of the educational process, MOODLe allows you to track learning outcomes: - monitoring performance in points awarded by a teacher in accordance with the existing system of knowledge assessment and transferred to an electronic journal; - report generation - collection of statistical data. If you add a variety of services here (file sharing, forums, testing system, chat, wiki pages), you can organize the following types of work online: - students complete control, independent, coursework, individual assignments, abstracts, presentations; - discussion in thematic and counseling in consulting forums; - testing (intermediate, final), including various types of test tasks (open, closed, matching and alignment of

the sequence) and is carried out in self-checking and control modes; - teamwork on wiki pages, we can get an idea of the complexity and richness of the MOODLe University platform as part of the modern information and educational environment.

Recall that the core of the university's internal e-learning system is the existing university Web resources bank, and therefore, the Bank of distance learning courses. Accordingly, the distance course was determined by the basic element around which the entire distance learning system at the university is built. According to the results of 2018, the Bank's distance courses (hereinafter referred to as DC) steadily approach 1000, compared with 870 courses in 2017. Creating and filling the Bank of web resources with distance courses first generates a cumulative effect and then a synergistic effect. First, initially distance courses were created for correspondence (distance) forms of education. In 2017, 877 students used distance learning courses by correspondence. In 2018 - 925. But the appearance of the first array of acceptable distance courses led to the emergence of blended learning already on the basis of full-time education. So, in 2017, full-time studies were connected to distance courses and 3,852 students were enrolled. In 2018 - 4428 students.

Secondly, the emergence of a sufficient amount of distance courses in the bank of the university's web resources actualized the following task: ensuring high quality teaching. The obligatory condition for solving this task is the procedure of certification of distance learning courses, which, in turn, is also a guarantee of the information security of the educational environment. At Karazin University, we chose a two-level subsystem for the formation of a high-quality array of distance learning courses, providing the teaching process both in correspondence and full-time forms of education. The first level is the protection of students of university courses "E-learning technologies in higher education" distance courses that they created in the learning process. The requirements for the course are as follows: 1. It must comply with the "Distance Course Structure Requirements". 2. The distance course must be fully prepared to be open to students or trainees. The second level of quality assurance is

certification. The course that has passed certification is recognized by the electronic educational-methodical manual by the decision of the Scientific and Methodological Council of the University. The distance course is placed in the repository of the university scientific library, receives all the details of the printed edition, and the author (s) receive a certificate stating the authorship of the distance course. It is important that only distance courses that are used in the educational process are certified. So by the end of 2017, 101 distance courses were certified. On January 1, 2019 - 133 distance courses that have passed certification. As of April 1, 2019, 143 DCs have already been certified. It is important that the intensity of the certification process increases. So in April - May 2019, at least 12 distance courses will be certified.

Let us return to the synergistic effect that is observed in the e-learning system of the Karazin University. Filling the Bank of web resources with a sufficient number of quality distance courses created a number of opportunities that have been implemented at the university over the past two years. Firstly, the availability of distance learning courses in various specialties allowed us to offer teachers of secondary schools and secondary schools an advanced training program with a significant distance component. At the beginning of 2019, 23 distant courses for secondary school teachers were used under this program. Of course, this required the creation of new distance courses, but the courses prepared for students were taken as a basis, or they were created by teachers who had already mastered the process of creating high-quality distance courses. In turn, the approbation of distance learning courses for teachers led to the need to create a special open information platform (environment) for teachers "Karazinskiy Prostir". The foundations were the requests of secondary school teachers to have access to distance learning courses in their specialty. In total, in 2018, 585 teachers of secondary schools in the Kharkiv region and other regions of Ukraine took advantage of this form of blended learning in the e-learning system of the university.



Secondly, the teaching of inter-faculty disciplines at the choice of students, implemented at the University, has created the need to accompany such disciplines with distance courses.

Thirdly, the emergence of a sufficient amount of distance courses in the bank of the university's web resources allows, finally, to fully ensure such a line of education as training according to individual plans. The realities of today are such that many students, starting from the second year of undergraduate studies, are forced to switch to individual study plans in connection with their employment. We see our task in providing such students with full-fledged educational electronic resources, allowing them to assimilate the necessary educational material and master the necessary skills, to acquire the necessary competencies. This task is designed to solve distance learning courses of the bank's web-based university resources.

Fourth, the obligatory presence of an interactive component in distance courses, related to the self-monitoring of student learning and external control based on tests that fall under the feedback section, has brought to life the emergence of a whole direction in the university e-learning system: based on the university platform LMS MOODLe. If in 2017, 1117 students from 30 disciplines participated in this form of knowledge quality testing, in 2018, 4507 students from 131 disciplines participated. At the same time, the bank of test questions and tasks amounted to 12,560 in 161 disciplines.

Fifth, in the same trend, another problem arose requiring its solution. In connection with changes in the conditions of admission to the magistracy, students were offered and implemented the ability to monitor foreign language knowledge on the basis of the university system LMS MOODLe. In November - December 2018, 986 4-year students of university faculties took this opportunity.

The third line of development of the university e-learning system is connected with the formation of a significant number of certified courses. First of all, to ensure the educational process at the university, a fund of electronic educational and

methodological manuals (distance courses) began to take shape, which, unlike conventional printed manuals, has an essential interactive component. The emergence of this fund changes for the better the situation with the resource-methodological support of the educational process.

One of the well-established trend of education in the world is the creation of databases of educational materials along with the development of traditional technologies for the development of electronic textbooks and multi-agent technologies of educational portals. In general, it is these components that determine the creation of a high-quality information and educational environment. That, in turn, is connected with the informatization-technological challenge of the 21st century. Technological knowledge is aging every 2-3 years. It will take some time and it will be 1,5-2 years. The volume of knowledge of university graduates doubles every 3-4 years with the inevitable selection of knowledge for important and minor ones. If you do not change the educational technologies and the mechanism for the formation of methodological educational resources, then, while maintaining the emphasis on printed educational and methodological manuals, the onset of collapse is inevitable. The use of the fund of electronic teaching materials on the basis of distance courses allows you to quickly update materials every year, and even more often as needed, completely eliminating the time lost associated with the process of printing benefits. In addition, students' knowledge assimilation using information and communication technologies, according to the lowest estimates, is 40–60% faster per unit of time than using conventional technologies. Textbooks or distance courses, electronic textbooks, which are being created today, speed up the process of mastering knowledge by 2-3 times.

Within this line - the creation of a significant block of certified courses - the opportunity arose to begin the practical implementation of the program of creating open courses in the e-learning system of Karazinsky University. The platform of open university courses has been tested, pilot courses have been tested and tested. Normal open courses (MEPs - according to the accepted terminology) are impossible without

high-quality video content. Therefore, the running-in of video lecture opportunities, video editing, the use of open video sources on the Internet was carried out within the framework of two video channels created within the framework of the university e-learning system. This is K-Universarium and E-Learning. The following results were obtained on the K-Universarium channel: the number of video clips (video files) was 35, the number of views was 22300, and the viewing time was more than 3 thousand hours. On the second channel, E-Learning, 110 video segments (video files) were posted, the number of views was 14,398, and the viewing time was 536 hours. The experience of creating video materials for distance learning courses made it possible to take the next step in the development of a distance learning system at the university. This year, all inter-faculty disciplines will be completed with promo videos, and then the next stage will be carried out - the preparation of review video lectures on all these disciplines. In any case, equipping distance courses with a variety of video materials, improves the quality of the courses, provides additional opportunities for students to master the training material.

In addition, there is an array of video content and structured, logically constructed educational material that allow you to create full-fledged courses in the MEPs system.

Another consequence of the availability of a ready-to-go distance course package allows teachers of the Institute of International Education to create the Distance Learning for Foreign Citizens program, which not only envisages the use of distance learning for foreign citizens as part of the preparatory department program, but also passing certain linguistic courses for students who are abroad. So, if 32 distance courses were prepared for distance education of foreign citizens, then 12 of them are language courses, and 4 of them are certified.

The implementation of the concept of blended learning (blended learning) as a process that provides for the creation of a comfortable information educational environment, a communication system representing all the necessary educational

information, made it possible to significantly expand the information and educational university space.

A blended model of teaching in a classical university in the framework of a systems approach provides students with new opportunities for mastering a specialty - you can not only revise the necessary material online at any time, but also get tested, test your knowledge of the subject, get acquainted with additional sources that exactly match studied topics. The system of distance learning in a mixed model allows the use of various additional elements in the study of disciplines - audio and video recording, animation and simulation. This system, including a forum and a built-in e-mail, allows you to communicate with classmates from home or using smart technologies, as well as communicate with the teacher and ask all the necessary questions without waiting for an in-person meeting. For us it was important that the departments responsible for the educational process and the teachers involved in this process determine the relationship between the traditional and innovative components of the educational process. Determine the proportion of filling the learning process with distance and full-time (traditional) forms.

The presence of a significant number of distance courses in the University's Bank of Web Resources allows to solve a number of tasks: first, to have a permanent resource for recreation centers on their use both in the part-time (distance) form and in full-time education; the second is to have a resource in case of updating the curricula of specialties; the third is to have a DC resource available, which is used to select students for study; fourth, to launch effective interactive feedback in the teacher-student system, including various forms of control and self-control of knowledge.

The information and educational space of a classical university should be constantly expanded, including new directions offered by modern e-learning, taking into account the requirements of information security.

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