

# Distance Learning Technologies in Institution of Higher Education by Means of LCMS Moodle

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**Abstract.** Distance learning (DL) is one of the most rapidly expanding sectors in higher education today. Distance Learning Development requires a consistent solution to a number of important tasks in the field of regulatory, organizational, educational, technical, software and staffing, the interaction of all these elements of the DL system in the implementation of educational programs. One of the most important tasks in organizing distance learning is to define a scalable and viable strategy for creating an information and communication environment. The article presents a review of distance learning literature; the purposes, advantages, disadvantages. The experience of Kherson State University in the use of distance learning was summarized. Particular attention is paid to the implementation features of the KSUONLINE distance learning system developed on the basis of LMS Moodle. The educational courses and webinars were designed to introduce teachers to the principles of creating Distance courses and learn how to ensure effective communication between teachers and students. The research of the level of satisfaction of teachers with seminars to study the capabilities of the distance learning system KSUONLINE was conducted. The main problems associated with the introduction of distance education in Institution of Higher Education are analyzed in this paper. The factors that influence the development of distance learning in universities are identified.

**Keywords:** Distance Learning, E-Learning, LCMS, Moodle, Technologies, Institution of Higher Education, Teacher Training.

## 1 Introduction

Distance learning refers to the individualized process of acquiring knowledge, abilities, skills and ways of cognitive activity of a person, occurs mainly through the indirect interaction of remote participants of the educational process in a specialized environment, functioning on the basis of modern psychological, pedagogical and information and communication technologies.

The legal framework for distance education in Ukraine was launched in 2000, when the "Concept for the Development of Distance Education in Ukraine" was approved. It envisaged the creation in the country of a system that would satisfy the needs of society

in the continuity of long life learning education and individualization of education. In Ukraine, there are a number of important laws and programs that regulate some issues of distance education: “On approval of the Program for the development of distance learning system for 2004-2006”, Order of the Ministry of Education and Science, Youth and Sports of Ukraine; “On approval of the Regulation on electronic educational resources”, Order of the Ministry of Education and Science of Ukraine; “On Approval of the Regulations on Distance Learning”; Approval of the sectoral concept of development of continuous pedagogical education. Order of the Ministry of Education and Science of Ukraine; CMU Resolution “On Approval of Licensing Terms of Educational Activity”.

The legal base of distance learning determines the behavior of the teacher in the distance learning process, provides preservation author's rights, outlines the duties of a tutor in the field of distance learning, normalizes work teachers in the field of distance learning, provides material incentives teachers to activities in the field of DL.

Ukraine has adopted a law on the Digital Agenda 2020, which outlines a strategy for non-formal education. Provision of state support for educational service providers is envisaged. It also points to the need to develop quality educational content, review and update training programs for training and training civil servants, educators and the unemployed, and the introduction of digital competencies. This can be a good basis for the development of distance education.

The state policy of Ukraine in the field of higher education, in accordance with the Law on Higher Education, is aimed at ensuring accessibility, quality and effectiveness of education. Various solutions are proposed, one of which is the informatization of education. In turn, informatization allows the effective development of such pedagogical technology as distance learning.

Distance learning has several advantages: to study at any place and at any time, independently determine the amount of information to be processed in a certain period, the ability to receive high-quality, relevant knowledge, training in several directions at the same time, or combination with work, etc.

Also, distance learning has several disadvantages: limited practical tasks and assessment of the student's independent work; limited feedback capabilities; problems of plagiarism and identification; support for motivation to successfully complete the online course.

The urgent problem is the use of distance learning technology in a modern Ukrainian university. The use of distance learning in higher education solves the problem of individualization, intensification and optimization of education, is the most logical and natural evolution of the traditional model of education. The main goal of introducing distance learning is to introduce new forms of learning into the educational process that correspond to the trends of global development and the formation of the information society. Many universities have launched distance learning platforms (most often Moodle). Currently, more than 70% of educational institutions use LMS Moodle. Most often, courses are used to support traditional learning or as blended learning.

An important issue is the quality of the courses and their relevance to the educational needs of the modern generation of students (Howe and Strauss, Tapscott, Prensky, Berk) [1].

## 2 Related Work

The first attempt to describe the structure of the distance education discipline was proposed by Holmberg (1985). He considers the evolution, principles and practices of distance education. His categorization system includes the following areas: 1. philosophy and theory of distance education; 2. distance students, their milieu, conditions, and study motivations; 3. subject matter presentation; 4. communication and interaction between students and their supporting organization (tutors, counsellors, administrators, other students); 5. administration and organization; 6. economics; 7. systems (comparative distance education, typologies, evaluation, etc.); and 8. history of distance education [2].

The relevance and importance of distance learning is evidenced by a large number of projects, including: European Distance and E-Learning Network – the smart network for the distance and e-learning community and a professional community for smart learning [3].

A huge number of scientific and practical conferences are held annually on various aspects of the introduction of e-learning and distance learning, in particular in higher education [4].

The main differences between “e-learning” and “distance learning” are location, interaction, intention. Although many scientists and practitioners of higher education consider these terms as synonymous, given the blurring of the boundaries between regular and distance education [5].

Scientific works of Ukrainian researchers V. Bykov, Yu. Bogachkov, I. Bulakh, V. Kukhareno, N. Morse, M. Savchenko, N. Sirotenko, E. Smirnova-Tribulskoi, A. Spivakovsky, P. Stefanenko, B. Shunevich, etc.[6] are devoted to organization of the educational process in distance learning in higher educational institutions.

The problems of preparation of teachers of universities for the introduction of secondary education are considered in the works [8-10].

Historical and pedagogical analysis of the problems of the formation and development of DL in Ukraine and beyond abroad showed that the world has gained positive experience in implementing systems distance learning (LMS). Despite the unstable socio-economic position, a system of Distance education arises and is developing intensively both in higher education and in corporate education [6].

## 3 Problem Setting

The analysis of current statistics shows that only a very limited number of enrolled students complete distance courses as most students drop out at initial stages. The reasons causing low motivation is:

- universities and employers of Ukraine do not recognize distance course certificates;
- the failure to complete many courses leads to a loss of guidance in training and the refusal of further courses;

- lack of live communication hinders the process of teaching courses. Experience with interacting with classmates, peer review increases the likelihood of completing the course.

Many universities are only developing procedures for recognizing the results of non-formal education, which can include the study of distance courses. Students are also unaware of this possibility. If will be appropriate procedures for recognizing the results of non-formal learning, the interest and relevance of distance courses can increase significantly. However, having a certificate does not guarantee an adequate level of knowledge. In addition, there are not enough courses with more difficulty. The bulk of the material is designed to be simple to reach more listeners. There are also far fewer technical courses that suggest specific types of practical work.

The legal support of distance education should be supported by normative documents, regulate the ownership of software and teaching aids, provide students with the right to use the material and technical base and include:

- the regulatory framework for the creation and functioning of a distance education system;
- a set of documents of the educational process that determine the content, level and quality of training of graduate students;
- a set of standards (requirements) of universities for the creation, certification and use of electronic educational materials;
- copyright protection of the creators of distance learning courses and computer training programs;
- receipt of final qualification documents;
- recognition of the results of mastering courses taught under licensed DL programs.

The purpose of the article is define a scalable and viable strategy for creating an information and communication environment that supports distance learning in Institution of Higher Education.

The tasks of the article:

- analyze of principles and practices of distance education, technological and methodological aspects of the use of distance learning in Institution of Higher Education;
- description of the experience of using LMS in Kherson State University;
- development of courses and webinars to improve the qualifications of university teachers in the field of distance learning;
- implementation of the KSUONLINE - Distance Learning Network of Kherson State University, as the learning management system in Institution of Higher Education.

## **4 Principles and Practices of Distance Education**

In Kherson State University there is an extending experience in distance learning [6, 7, 11-15]. The experience of the staff of Kherson State University Research Institute of Information Technologies in implementation of scientific and technical work within the

framework of the government program «Information and communication technologies in education and science», according to the agreement № IT/583-2009 from 23.10.2009 presented in [7]. As the result a web-resource "Bank of electronic documents in distance learning of higher pedagogical education" was formed.

Kherson State University has extensive experience in creating and implementing distance learning, including the development, maintenance and implementation of distance learning systems and integrated learning environments:

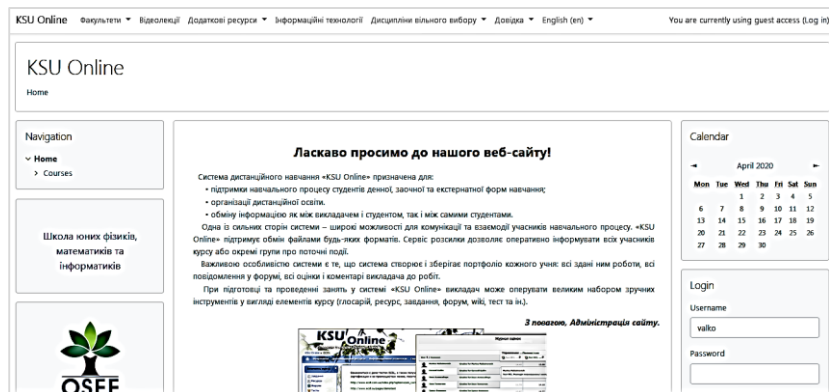
- Kherson Virtual University Distance Learning System (KSU development) [20].
- KSUONLINE - Distance Learning System based on LMS Moodle [21].
- Web portal ECDL e-learning for higher education (ECDL).
- Integrated Distance Learning Environment "Fundamentals of Algorithmization and programming" (based on LMS Moodle).
- Web-Almir Distance Learning System (own development of KSU).
- Integrated environment study course "Analytical Geometry" (KSU development).
- Integrated environment for testing student of economics and mathematics standardized parts for higher education for the specialty 6.050100 "Banking" 6.050101 "Economic Theory" (based on LMS Moodle).

The university has Department of Support for Academic, Informational and Communicational Infrastructure performs, whose tasks are:

- Design and development of Web-sites for different educational areas using Open-source systems.
- Design, development and support of educational software.
- Participation in competitive projects of fundamental research in the fields of "Informatics" and "Information technology".
- Holding an anonymous voting by KSU Feedback service.
- Publication of courses in the distance learning systems "KSU Online" (Fig. 1), "Kherson virtual university".
- Installation and support of the educational software tools.
- Exhibition activity.
- Consultations of the University staff and students.

The Moodle system meets all the basic criteria for e-learning systems:

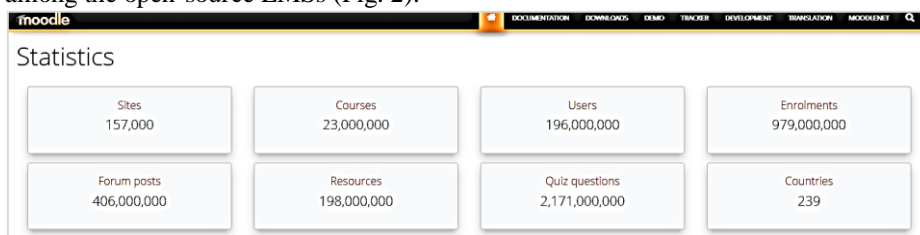
- functionality - the presence of a set of functions of different levels (forums, chats, analysis of the activity of students, management of courses and study groups, etc.);
- reliability - ease of administration and training management, ease of updating content based on existing templates, protecting users from external influences, and the like;
- stability - a high level of stability of the system relative to various modes of operation and user activity;
- cost - the system itself is free, the costs of its implementation, course development and maintenance are minimal;
- lack of restrictions on the number of licenses for students;



**Fig.1.** KSUONLINE - Distance Learning System of Kherson State University based Moodle, homepage

- modularity - the presence in training courses of a set of blocks of material that can be used in other courses;
- the presence of built-in tools for the development and editing of educational content, the integration of various educational materials for various purposes;
- support for the international standard SCORM (Sharable Content Object Reference Model) - the basis for the exchange of electronic courses, provides the transfer of resources to other systems;
- availability of a system for testing and evaluating students' knowledge on-line (tests, tasks, monitoring activity on forums);
- convenience and ease of use and navigation - an intuitive learning technology (the ability to easily find the help menu, ease of transition from one section to another, communication with a teacher-tutor, etc.) [22].

According to existing literatures [7], Moodle still comes out as the top used system among the open-source LMSs (Fig. 2).



**Fig.2.** World statistics of LMS Moodle usage [16]

Moodle LMS has about 196 million registered users, 157 thousand educational portals, 23 million courses in 239 countries and unites more than 300 software developers.

The Moodle system implements the philosophy of "social constructionism pedagogy" and is focused primarily on organizing teacher-student interaction in the learning

process, although it can also be used to organize traditional distance courses as well as to support part-time and distance learning.

The design of the training course is to select effective tools used in the learning process to achieve the intended learning objective. There are two modifiers that influence the choice of tools that support the learning process:

- Personalization - implementation of individual educational trajectories.
- Involvement - embedding motivation mechanisms to reach the maximum number of trainees as planned.

In Kherson State University established "Regulations on distance learning at Kherson State University" [17]. The main provisions of this document are that these types of classes, such as self-employment, training, practical training, can be carried out in asynchronous mode. This will give impetus to the creation of courses that will support these types of classes.

From the year of foundation to the beginning of 2020, 409 courses were created on the platform KSUONLINE.

It is important to understand that the modern distance learning course is not just system of files with lectures, tasks, literature and tests which are loaded into the LMS.

According to the UNESCO Diversification of learning platforms [18] analytical note, the need to supplement LCMS functionality with web 2.0 services is emphasized. The support system for distance learning includes [19]:

- hardware (personal computers, network equipment, uninterruptible power supplies, servers, equipment for video conferencing, etc.) that ensure the development and use of web resources for educational purposes, educational process management and the necessary types of educational interaction between subjects of distance learning in synchronous and asynchronous modes;
- information and communication support with bandwidth of channels, which gives all subjects of distance learning round-the-clock access to web resources and web services for realization of educational process in synchronous and asynchronous modes;
- general-purpose and special-purpose software (including those with special needs) that must be licensed or built on open source software;
- Web-based resources of the courses (programs) required for distance learning may include:
  - methodological recommendations for their use, sequence of tasks, control features, etc;
  - planning documents for the educational process (curricula, thematic plans, classes);
  - multimedia lecture materials;
  - terminological dictionaries;
  - practical tasks with methodological recommendations for their implementation;
  - virtual laboratory work with methodological recommendations for their implementation;
  - virtual simulators with methodological recommendations for their use;

- packages of test tasks for carrying out control measures, testing with automated verification of results, testing with verification by a teacher;
- business games with methodological recommendations for their use;
- electronic libraries or links to them;
- bibliography;
- a distance course that integrates the above web-based resources of the course (program) into a single pedagogical scenario and other educational resources.

## **5 Experience in introducing distance courses at KSU**

The topic of introducing distance learning is not new, There is a good world and domestic experience. In society there is an understanding of the importance and perspective of distance learning. The development of distance education at the university requires some resources, including specialists to administer distance learning platforms, but the main thing is the teachers who will develop distance courses and accompany the educational process. Analyzing the state of development of DL at KSU, it should be noted that the university has a system of regular seminars on the creation of training courses on each of the two distance learning platforms. The results of four advanced training courses for teachers of category 45+ in distance learning at Kherson State University are described in the publications [13-15]. A group of teachers has been formed, who have been actively using the capabilities of DL platforms, but the number of such teachers has been growing very slowly in recent years, because:

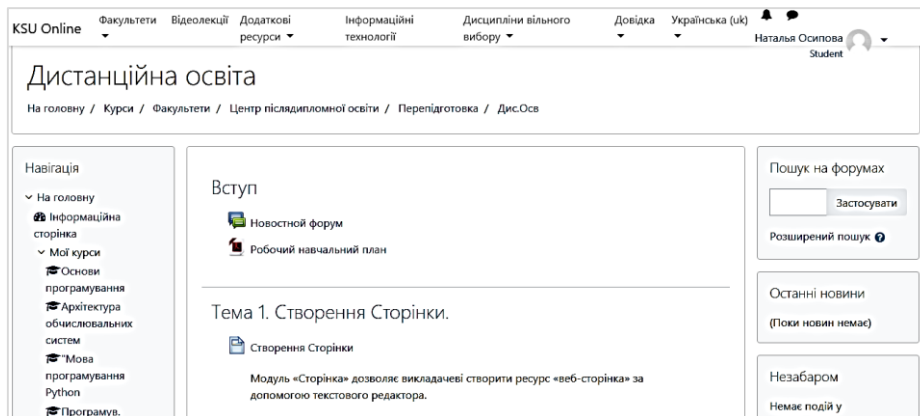
- creating a distance course takes a lot of time. The course materials are different from the materials used by the teacher in the regular classroom. And the preparation of such materials has been ongoing for a long time, through several iterative changes;
- an additional incentive system is required;
- the need for technical support;
- self-organization, the need for a sufficiently high level of student preparation for successful work in LMS;
- lack of collaborative work;
- obsolescence and lack of regulatory laws and lack of implementation practices;
- low teacher awareness of LMS courses creation and use;
- the courses created are often overflowing with copies of textual data, lack of clarity, formative assessment, group and teamwork;
- the primary reason for the unsuccessful courses is the lack of training for teachers to familiarize themselves with the LMS and create their components.

To date, the development of DL is taken into account in the Key Performance Indicators of the teacher. Quarantine has become a powerful external stimulus, which has actually forcibly transformed educational establishments of various levels into the format of DL.

A situation has arisen when teachers have started creating distance-learning courses en masse. Many technical questions were raised in the development process as teachers

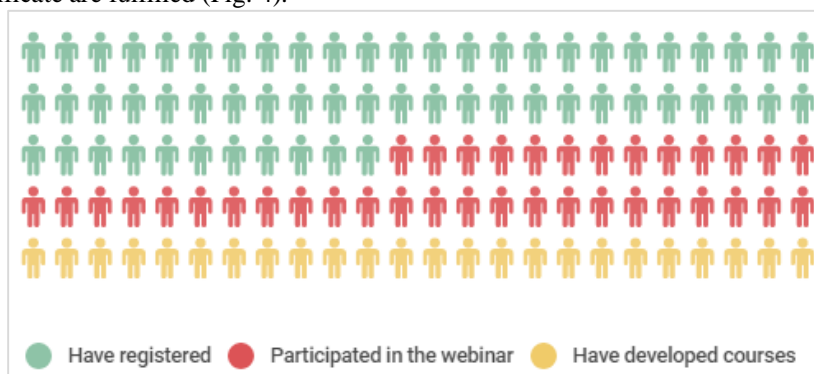


had different levels of digital skills and different experience in using ICT in their professional activities. At the same time, people were in a situation of "alone on their own" with problems that arose. Against the background of the general psychological pressure, the need to quickly rebuild the style and mode of working with students, all this caused even greater difficulties. All teachers were sent emails via corporate mail with instructions for creating new distance courses and system administrators' emails were specify. Afterwards, we were invited to host a ZOOM webinar, which was attended by 93 people. After conducting the webinar, everyone who signed up was sent letters with a link to the video recording of the webinar, links to two courses "Workshop Tutor" and "Distance Education" (Fig. 3), again the addresses of system administrators, tasks-requirements for obtaining a certificate, links to surveys to evaluate the quality of the webinar.



**Fig.3.** The course of “Distance Education” in system KSUONLINE

In general, the statistics of the training seminar were as follows: 93 teachers enrolled, 58 - participated in the webinar, 37 - developed courses and sent a link to the course to the organizers of the training seminar to check that the conditions for obtaining the certificate are fulfilled (Fig. 4).



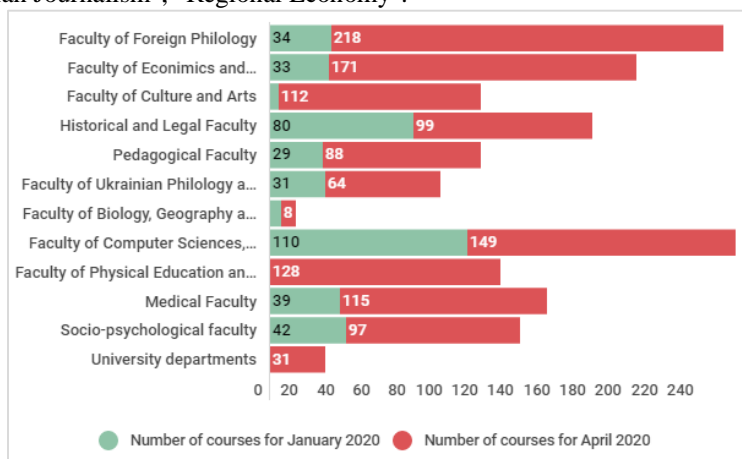
**Fig.4.** The statistics of the training seminar

After the seminars, statistics of DL-courses, which were created in the KSUONLINE, have changed significantly (Table1).

**Table1.** The statistics of the course developed

Faculties	Chairs	Number of courses for January 2020	Number of courses for April 2020
Faculty of Foreign Philology	5	34	218
Faculty of Economics and Management	5	33	171
Faculty of Culture and Arts	5	5	112
Historical and Legal Faculty	5	80	99
Pedagogical Faculty	4	29	88
Faculty of Ukrainian Philology and Journalism	4	31	64
Faculty of Biology, Geography and Ecology	4	6	8
Faculty of Computer Sciences, Physics and Mathematics	3	110	149
Faculty of Physical Education and Sport	3	0	128
Medical Faculty	3	39	115
Socio-psychological faculty	3	42	97
University departments	2	0	31

Examples of course titles developed from the results of a training seminar: "Sports specialization with teaching methods", "General linguistics ", "Anatomy and physiology of children and adolescents", "Modern Ukrainian literary language", "Genetics with the basics of breeding", "Tourist recreational complex of Ukraine", "History of Ukrainian Journalism", "Regional Economy".



**Fig. 5.** The difference between the number of courses

It should be noted, that a greater increase in the number of courses occurred at the faculties: Faculty of Foreign Philology, Faculty of Economics and Management, Faculty of Physical Education and Sport (Fig. 5).

## 6 Conclusions and Outlook

The proposed strategy includes the evaluation of distance-learning training networks available in the Institution of Higher Education, as well as distance learning activities developed and implemented in order to ensure more effective achievement of learning goals.

Today the relevance of the topic of distance learning has gained new strength under the influence of external circumstances. Therefore, there was a need to revise the previous experience of distance learning, including the system of advanced training of teachers, to find fast effective forms of their counseling and training. Another important aspect is the creation of a system of motivational factors contributing to the development of distance learning including: the creation of a system of additional stimulation of teachers to create courses in the form of advanced training, rating system to evaluate the activities of the teacher, etc. It is advisable to introduce an internal system of certification of distance courses.

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