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DISTANCE LEARNING TECHNOLOGIES IN A HIGHER EDUCATIONAL INSTITUTION: EXPERIENCE IN USING AND IMPLEMENTING E-LEARNING COURSES IN THE EDUCATIONAL PROCESS

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Distance learning technologies occupy a strong position in the higher education system: they can serve as an instrumental basis for organizing distance learning, they can be actively used in combination with traditional forms and methods of teaching, and they can be used to build networking between universities and employer organizations. There is much experience in using distance learning technologies by university teachers when working with students, which needs to be rethought.

The purpose of this study was to show how an educational platform, such as the S. Kuznets KNEU Personal Learning Systems, can be used to provide educational services in the face of unpredictable barriers in the current circumstances in Ukraine to substantiate the importance and feasibility of developing and implementing distance learning courses on this platform to increase the efficiency of distance learning.

The study reveals the importance of using distance learning technologies in the educational process. Distance learning offers many advantages, such as geographical diversity, efficiency, continuity, individual approach and personalized program. The article analyzes the experience of using distance learning technologies on the example of Simon Kuznets Kharkiv National University of Economics. The existing difficulties of using distance learning technologies are specified. The algorithm for using the Moodle distance learning system as a tool environment for developing online courses by teachers, distinguished by its functionality, flexibility, reliability and ease of use, is prescribed.

However, Ukraine's education system must catch up with the fundamentals underlying distance learning courses. It is necessary to train highly qualified teaching staff capable of working with students remotely to ensure the effectiveness of distance learning, provide students with updated learning materials, and make courses comprehensive, engaging, and easy to understand. However, the prospects in this area of education in Ukraine are prominent

Keywords: *distance learning technologies; information technologies; personal learning systems (PLS) distance learning; E-learning; Moodle; learning management systems (LMS)*

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1. Introduction

The system of higher educational institutions is focusing on the implementation of distance learning technologies, which are information technologies that ensure the delivery of the main volume of learning material to students as well as interactive interaction between students and teachers in the learning process, providing students with opportunities for independent work on mastering the material being studied as well as in the process of learning [1].

E-learning is a relatively new type of education in Ukraine. It became actively used during the COVID and martial law period in Ukraine [2], so optimal distance learning methodologies are being worked out to make it as effective as possible. This format is becoming an in-

creasingly convenient option for those wishing to acquire quality knowledge and save resources.

Distance learning:

– it is geographically broad: the opportunity to receive a quality education in any region of the country, as well as abroad;

– responsiveness: rapid updating of training materials enables the use of the most recent market information as well as

– receiptiveness: training materials are rapidly updated, allowing users to apply the most recent market information, while responding to audience requests;

– continuity and individual approach: a learning process that does not interfere with work or family life; each trainee can develop a personal learning program [3];

– the programme can be delivered in a personalized way.

To be a learning professional, educators must stay current daily. Past learning terms are being replaced by new ones, such as blog, wiki, avatar, smart agent, interactive content, animated, role-playing, simulation, multi-user dimension (MUD), and object-based multi-user dimension [4]. One has to learn how to navigate distance learning trends.

E-learning is a set of tools that are implemented in different educational programs. Educational programs in the world today can only be implemented by using Internet technology. It means that e-learning is integrated into all educational programs.

According to "The State of Technology" in Education report, presented by Promethean analysts, in the next 1–3 years, cloud-based tools for organising and conducting classes will take the leading position (35.6 %). Online student assessment resources come in second (31.4 %), virtual and augmented reality come in third (25.3 %), programming and robotics technologies come in fourth (21.8 %), and e-learning comes in sixth (21.6 %) [5]. According to the latest indicators of the Global Skills Index (GSI) from Coursera, Ukraine occupies a leading position (8) in terms of competencies in the field of technology [6].

As stated by the 8th Annual Educator Confidence Report 2022, educators feel technology benefits the educational experience. Pandemic-Era Tools educators say are vital: tools used to communicate between educators and parents (63 %); tools that deliver interactive learning opportunities to students (57 %); video conference tools (52 %) [7]. Overall, educators feel technology benefits the educational experience for themselves and students.

Students welcome high-tech in education; the knowledge, skills, and abilities gained will be helpful in their self-improvement and career development [8]. Information and communication technology has become a valuable tool for many, acquiring the learner's unique needs and preferences. The distance learning system provides an extensive range of opportunities for both learners and those involved in the organisation of the learning process [9].

The use of distance learning technologies in the educational process is actualised in connection with the needs of modern society and the labour market, which requires competitive specialists in information technologies in education [10]. Higher educational institutions use distance technologies to implement conditions that serve as a basis for building individualisation of the educational process [11] and making individual academic directions of students [12].

Distance learning technologies occupy a strong position in the system of higher professional education: they can serve as an instrumental basis for distance learning [1], can be actively used in combination with traditional forms and methods of learning [4], and can be used to build network interactions between higher educational institutions and employer organisations [5]. To date, much experience has been accumulated in using distance learning technologies by university teachers when working with students, and it requires rethinking.

2. Literary review

Works [13–15] provide information on the terminology, associated with distance learning. In the most general sense, distance learning is understood as learning using IT technologies. Since the possibilities of using IT technologies to improve the quality of learning are quite diverse [16], depending on which area of education and how exactly they are implemented [17], several directions of e-learning development are considered [18]. Self-learning, text, graphics, audio, and video materials; high levels of interactivity and discussion; accessibility and global availability; increased diversity of learners; and increased collaboration are some benefits of using computer technology in the classroom [19, 20].

According to C. Hodges [21], "a short-term shift of delivering learning content, which includes the utilisation of remote teaching tools for the education process that would alternatively be delivered face-to-face, and that will return to the form, used before the emergency." Distance learning is now more commonly thought of as a delivery mode.

These remote teaching tools for the education process include digital learning management systems (LMS) like Moodle, Masteriyo, Blackboard Learn, and Schoology, virtual classroom tools like Google Classroom Zoom, Hangouts Meets, and Adobe Captivate, as well as MOOC platforms like Coursera, EdX, Udemy, and Prometheus [22].

As a result, distance learning creates new opportunities and approaches to education. Distance technologies are related to increasing access to education at all levels and realising educational opportunities [23]. Moreover, distance learning mandates updating subject-matter instruction and learning materials [23]. A new structure for the educational process is implied by distance learning [24]. At the same time, the organisation should be designed as a pedagogical system [25] that uses distant learning technologies to accomplish its various components (goals, principles, content, methods, and forms of educational activities) [26].

This study uses a theoretical framework based on regulations and provisions of the distance learning at S. Kuznets KNEU [27–30].

3. Research aim and tasks

The aim of this study was to demonstrate the use of educational platforms, such as "S. Kuznets KNEU Personal Learning Systems (S. Kuznets PLS)" under wartime conditions in Ukraine and unpredictable barriers in providing education in the current environment.

To accomplish the aim, the following tasks have been set:

1. To analyse the accumulated experience of using distance learning technologies in S. Kuznets KNEU.
2. To describe the experience of using Moodle in the educational process of the S. Kuznets KNEU Personal Learning Systems.
3. To substantiate the significance and feasibility of developing and implementing distance learning courses on the Moodle platform to improve work quality and specify the existing difficulties in its application.

4. Materials and methods

This study uses a systemic approach to the formation and development of information skills in university education, which involves the consideration of objects, subjects, approaches, and methods as separate elements of the educational process. The following methods were used in this study: theoretical (analysis, synthesis, generalisation, and systematisation of scientific-theoretical and methodological literature) to define the research concepts; empirical-diagnostic (discussions, pedagogical observation) to study the results of educational activities and determine the level of formation of students' independent work; and educational experimentation (stages of launch, formation, and control) to test the performance of the system of relevant didactic tools based on the platform. Simon Kuznets Kharkiv National University of Economics (S. Kuznets KNEU) is the object of analysis for the experience of using distance learning technologies. The study uses a theoretical framework, which is based on the literature on distance learning, and an empirical framework, which reflects responses from international universities and focuses on the Ukrainian example of S. Kuznets KNEU.

5. Research results and discussion

The use of modern information technologies, including distance learning, has significantly strengthened traditional approaches to the educational process in higher educational institutions. The reason for this is the rapid development of information and communication technologies and, consequently, the emergence of new modern pedagogical approaches to conducting lectures and practical and laboratory classes. The concept of distance education in Ukraine emphasizes that it creates conditions for implementing a system of continuous "lifelong learning" and provides individualization of learning in mass education. Simultaneously, this organization must be built as a pedagogical system, comprised of elements (goals, principles, content, methods, and forms of learning activities) and supported by information and communication technologies.

Under martial law, S. Kuznets KNEU was forced to move the educational process to a pure distance learning format. Distance learning technology means the electronic or digital learning media, including the Internet, e-mail, television, and other audio-visual communication devices, used to deliver instruction where the teacher and the students are in separate physical settings.

The COVID-19 experience, as well as preliminary university developments, aided S. Kuznets KNEU. The emergence of Massive Open Online Courses (MOOCs) has helped to shift significantly towards distance learning, particularly with the active introduction of distance learning technology into the educational process. High participation, short video lectures, and peer reviews characterise MOOCs. It was widely used in the emergence of MOOCs providers, such as Coursera, edX, Khan Academy, and Udacity. The introduction of distance learning at S. Kuznets KNEU had to ensure that the necessary technological tools were available to support student learning best. Having understood the distance learning needs of both students and faculty, S. Kuznets KNEU set about choosing the right technology to support the transi-

tion. Although the number of distance learning tools on the market is vast, S. Kuznets KNEU paid attention to the following components when selecting technology: learning management, collaboration, productivity, digital modelling and assistive technologies. It should be noted, that distance learning technology is not a one-size-fits-all approach. Technological tools that work for one university may not be suitable for another.

S. Kuznets KNEU has opted for learning management systems technology. Learning management systems (LMS) are software applications for delivering course materials, assigning tests, tracking student progress, providing feedback, sharing announcements, and publishing grades. Many learning management systems are cloud-based, allowing students to access content through a web login. An LMS is the backbone of the distance learning technology stack and is often integrated with collaboration and productivity tools. The main advantage of an LMS is the convenience of centralised storage of all course content, allowing instructors to streamline workflows and provide structure for students. However, this distance learning model assumes that the most significant changes in the educational process will involve a change in the role of teachers and a completely different student experience, as well as ensuring that the right technological tools are in place to support student learning best. Some popular Learning management systems, used by educational institutions, include Moodle, Canvas, Blackboard Learn and Schoology. Moodle has been adopted at S. Kuznets KNEU.

Distance learning at S. Kuznets KNEU at Moodle is developed, designed, and delivered Personal Learning Systems (PLS) consisting of interactive and offline content. The PLS is carefully structured and has a primary and additional level. Each topic can have the following content: essential questions, keywords, theoretical material, self-study questions, examples with formulas and pictures, test tasks, appearing prompts, and a list of references. The content of these levels is characterised and supported by practical examples.

Distance learning technology (DLT) has been a focus of S. Kuznets KNEU for ten years, during which the priority areas of the university's work in this area have been identified: elaboration of principles for distance learning technology for both economic, technical, and humanities training areas in part-time and full-time education.

Development of quality control methodology for distance learning training and quality evaluation of its results; implementation in distance learning: providing students with e-learning materials, network counselling, remote rating control; application of DLTs in traditional full-time education to support classroom IT, use of computer-based rating testing, organisation of students' independent work with network support; DLTs, extended to retraining and advanced training courses for specific areas and specialities according to the profiles of graduate departments of the university, as well as to pre-university training; improvement of DLTs: introduction of training video courses, simulation programmes; emphasis on economic and humanities specialities, where the university has qualified personnel and experience in training specialists, ties with Ukrainian enterprises, as

well as with European partners have become a distinctive feature of the distance learning system development at S. Kuznets KNEU

University distance learning is implemented mainly as a learning technology within the existing distance learning form. Its difference from traditional training technologies is an increase in the share of independent work time in the study of the discipline, which includes work with electronic teaching materials, remote consultation, and periodic testing. The focus of the teacher's work is shifted to the coordination of students' work, individual counselling, control and correction of the learning process, and organisation of group work. That is, the teacher supports the student's independent work with methodical assistance, step-by-step control, and management of the learning process. Of the existing technologies for distance learning in the university, Internet technology is used as a basis.

The university's distance learning system's components are hardware, software, and organisational and methodological structures.

The following role allocation (access rights) system is developed on the website of S. Kuznets KNEU PLS. Product Owner (responsible for project team work; definition of project requirements; communication with "customers"); Product Manager (responsible for IS development and management; analysis and prioritisation of requirements; formation of a roadmap and backlog; monitoring tasks and controlling their work); Architect (responsible for the selection of architectural solutions; formation of design specifications; formation of technical documentation), Tech Leader (involves development students in the project team; responsible for technical solution selection according to technical objectives; responsible for developing quality); Lecturer (has the right to edit the course and add other users with teacher, assistant, or student rights); Tutor (can edit course materials; usually assigned to teachers who teach practical and laboratory classes and enroll students in the course); Assistants (lecturers who do not edit but can grade and check papers); Methodologist (has no editing rights, but can revise data and statistics on students' learning activities); Student (has access to the course materials and can perform certain activities, such as uploading their files, taking tests, completing assignments, and viewing their grades); Guest (has minimal privileges, can access courses with guest access enabled).

The technical means of the university distance learning system is a system of servers and workstations - support student-teacher communication, student self-study, and student-group communication. The servers host the websites of the university distance learning centre, which include all the necessary components to support distance learning.

The administrative software within DLT supports the registration of different types of users, the organisation of information flows between users, the administration of the learning process, the structuring of learning material, the organisation of different types of user interfaces, and the collection of statistics on user and software performance.

The main subsystems of distance learning software are controlling (provides system administration,

forms the shell menu, organises connection to databases), training (provides electronic information and methodological resources, supports active elements of courses), and managing (combines the database and testing system, provides monitoring of users' work).

Software that supports the operation of a distance learning site forms and maintains individual components of the system: training materials, databases, organisation of classes, grading, administration, feedback, and communication with trainees.

Information support of the system within DLT includes: a database of students (test results, score sheets, individual information); a database of course administrators (managers) (lists of disciplines, information on assignments, information on teachers); electronic libraries of specialities (educational and methodical complex in the form of work programmes, syllabuses, and educational and methodical literature).

Organisational support for the learning process is provided by the administrative structure of the higher education institution: educational and methodological directorate, teachers-administrators (managers) of the courses, and lecturers of the courses. The teaching and methodological complex, which includes the speciality's working program, syllabuses, a technological map, and a timetable with deadlines; lecture notes with the study methodology and references to electronic educational and methodical literature, published in the university; methodical instructions for practical assignments with individual variants; methodical instructions for independent assignments.

The priority task of the university in this direction is the organisation of the educational process on the DLT for all forms of education and development based on the received system of lifelong learning. A challenging issue in developing DLT S. Kuznets KNEU PLS at the university remains the staging of laboratory workshops for technical specialities in virtual laboratory complexes.

In recent years, the university has issued some orders and regulations that constitute a corporate standard for using distance learning technologies in the educational process at KNEU. In particular, these are the regulations of 2020. "Regulations on personal learning systems at S. Kuznets KNEU"; "Regulations on the organisation of the educational process at S. Kuznets KNEU"; "Regulations on the organisation of assessment of learning outcomes and quality of higher education using distance learning technologies at S. Kuznets KNEU"; "Regulations on the organisation of the educational process using distance learning technologies at S. Kuznets KNEU".

They define the main stages of preparing and conducting the learning process using DLT S. Kuznets KNEU PLS:

1. The procedure for conducting training sessions with the use of distance learning technologies in the distance learning system is defined, which includes:

- 1.1. Setting up a discipline in the distance learning system:

- creating training and methodological materials for theoretical (lecture) courses and practical classes and completing laboratory works, essays, projects, control works, course projects, and other assignments.

- creating active discipline elements, such as tasks, tests, and counselling tools for individuals and groups.

- setting deadlines for assignments and tests per the study schedule and connecting groups of students to the discipline.

1.2 Supporting the discipline in the distance learning system:

- conducting individual and group counselling of students;

- checking and evaluating students' current assignments and tests;

- passing exams for the discipline.

2. The mandatory active elements of electronic methodological materials in conducting classes with the use of distance learning technologies are defined:

2. 1. When students study the theoretical material of the discipline (lecture course):

- in the general access mode for all students, for student communication.

Group (stream) – a component of the "Forum" distance education system;

- for individual student counselling, a component of the distance learning system is an "unevaluated task with an answer in the form of a text";

- For knowledge control: one or more elements of the distance learning system "Test," each containing at least 20 questions on the discipline's theoretical material.

2. 2. When students take practical classes in the distance learning system:

- at least one element of the distance learning system, "Assignment with answer in the form of a file," with individual variants for each student and evaluation in the distance learning system

- on practicum

2. 3. When students perform a laboratory work in the distance learning system:

- at least one element of the distance learning system, "Assignment with an answer as a file" with individual options for each student and assessment in the distance learning system

- for each laboratory work performed

2. 4. For project work, quizzes, course projects, and papers:

- at least one distance learning system component, "Assignment with an answer as a file," with individual options for each student and assessment in the distance learning system

- for each type of work

2. 5. When administering a pass/fail exam in the distance learning system:

- one or more elements of the "Test" distance learning system, containing at least 20 discipline-related questions

3. Deadlines are defined:

- for placing electronic materials on the discipline in the distance learning system – no later than 14 days after the end of the previous examination session;

- for answering the students' requests in the forum, in case of individual consultations – not more than three days;

- for checking tasks of practical and laboratory works – not later than more than seven days;

- for examination of control works – no more than two days, but no more than at least one week before the examination session.

The mandatory minimum of electronic teaching materials for distance learning systems in conducting classes with the use of distance learning technologies has been determined:

4. 1. General materials:

- the working programme of the discipline;

- methodological recommendations for the study of the discipline - plan of study of the discipline, including specific instructions: what tasks and time frame the students have to complete.

4. 2. Theoretical course:

- modular lecture course;

- midterm and final tests of the theoretical course.

4. 3 independent work:

- laboratory works: methodical instructions for laboratory works, tasks for laboratory works – individual variants;

- Practical exercises: guidelines for practical exercises, individual variants.

- Course project (course work): methodical instructions for the course project (course work), tasks for the course project (course work) – individual versions, term paper – individual versions;

- abstract/project: methodical instructions for writing an abstract/project, topics of abstracts – individual versions;

- control works: methodological guidelines for the performance of control works, assignments for control works – individual assignments.

4. 4. Exam (credit): questions for an exam (credit), testing on the all materials of the discipline.

a. Interactive communication modules: group (stream), common access forum (flow), individual counselling.

The order of storage of final semester electronic copies of courses that include explanatory notes and graphic materials for term projects and papers, essays and projects, tests, answers to credit and exam tasks, and other assignments, completed by students in the distance learning with the use of networking software of the distance learning system: teachers conducting classes with students using distance learning technology are obliged, at the end of the session, to make a complete semester-long electronic backup of each discipline, including all teaching and learning materials and user data for all elements of the discipline.

This study was limited to the experience of using distance learning technologies of S. Kuznets KNEU only. The study's results can be extended to other universities with further research only.

At S. Kuznets KNEU, further introduction of distance learning technologies into the educational process is planned. Their application makes vocational education more accessible, gives an impetus to developing new information technologies in traditional forms of learning, and increases the potential of the higher educational institution as a whole.

6. Conclusion

1. S. Kuznets KNEU has been concentrating on distance learning technology for ten years. During that time,

the main areas of the university's work in this field have been identified: the development of distance learning technology concepts for full-time and part-time economic, technical, and humanities training programs. The creation of a quality control approach for training via distance education and the quality assessment of its outcomes; application of distance learning technology in traditional full-time education to support classroom IT; use of computer-based rating testing, organisation of students' independent work with network support.

2. The S. Kuznets KNEU Personal Learning Systems are an increase in independent work time in the study of the discipline, focusing on coordination of students' work, individual counselling, control and correction of the learning process, and organisation of group work. Internet technology is used as a basis, with servers and workstations supporting student-teacher communication, student self-study, and student-group communication. Administrative software supports registration, administration, and user and software performance statistics. Distance learning software is composed of three main subsystems: controlling (provides system administration, forms the shell menu, organises connection to databases), training (provides electronic information and methodological resources, supports active elements of courses), and managing (combines the database and testing system, provides monitoring of users' work). Software that supports the operation of a distance learning site forms and maintains individual components, such as training materials, databases, organisation of classes, grading, administration, feedback, and communication with trainees. Information support includes a database of students, course administrators (managers), and electronic libraries of specialities. The administrative structure of the university provides administrative support for the learning process. One of the goals of the distance learning system of S. Kuznets KNEU is

the organisation of lifelong learning: pre-university, higher education, and retraining.

3. The Ukrainian education system has long been characterised by fundamentalism rather than practice orientation, which is the basis of distance learning courses and their competitive advantage. An acceptable distance learning performance is achievable if the university has quality content and highly professional developers and specialists. Both are serious problems for Ukrainian distance learning. The need for better learning content, e-learning methodologists, and professional online tutors remains the main factor constraining the development of the Ukrainian distance-learning market. Nevertheless, the prospects in this field of education in Ukraine are clear, and in order to ensure the effectiveness of distance learning, it is necessary:

- to train highly qualified teachers capable of working with students in an e-learning environment;
- to provide students with updated teaching and learning materials, and the courses should be comprehensive, exciting, and easy to follow;
- to organise feedback and to allow for online discussions;
- to organise online discussions and consultations with teachers and share information with colleagues.

Conflict of interest

The authors declare that there is no conflict of interest in relation to this paper, as well as the published research results, including the financial aspects of conducting the research, obtaining and using its results, as well as any non-financial personal relationships.

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Data will be made available on reasonable request

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