

## EXPERIENCE OF INTRODUCING THE TOOLS FOR DISTANCE TEACHING WORK AND STUDENTS' LEARNING AT LVIV NATIONAL ENVIRONMENTAL UNIVERSITY

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### **Snitynskiy V., Fediv I., Fediv R. Experience of introducing the tools for distance teaching work and students' learning at Lviv National Environmental University**

*This study provides a comprehensive overview of the measures implemented by Lviv National Environmental University (LNEU) from 2020 to 2023 to enhance their distance learning and teaching system amidst the challenges posed by the Covid-19 pandemic and military invasion. The article examines the limitations encountered by the University's administration and educators while implementing distance learning and discusses the steps taken to overcome these obstacles. Various specific measures adopted by LNEU are analyzed, including the restoration and improvement of the Moodle learning management system, the utilization of licensed Microsoft products, the implementation of an electronic journal, the introduction of an automated curriculum scheduling system, and the establishment of an electronic document approval system. Furthermore, the study outlines the introduction and practical aspects of these initiatives within the University.*

*The research is focused on the key concepts such as distance learning, higher education, Labster (a virtual laboratory platform), LNEU, Microsoft Teams (a collaborative communication tool), Moodle (an open-source learning platform), and virtual reality. By examining these areas, the article sheds light on the experiences and outcomes of implementing these tools and technologies for remote teaching and learning at Lviv National Environmental University.*

*The findings of this study contribute to the broader discourse on distance education in higher education institutions, offering insights into the strategies employed by LNEU to ensure the continuity of education in the challenging conditions. The analysis of the University's experience and the utilization of various digital tools provide valuable lessons and recommendations for other educational institutions navigating the complexities of distance learning.*

**Key words:** distance learning, higher education, Labster, Microsoft Teams, Moodle, virtual reality.

### **Снітинський В., Федів І., Федів Р. Досвід з впровадження інструментів дистанційної роботи викладачів та навчання студентів у Львівському національному університеті природокористування**

*Подано вичерпний огляд заходів, реалізованих Львівським національним університетом природокористування (ЛНУП) з 2020 по 2023 рік, для покращання системи дистанційного навчання та навчання в умовах викликів, пов'язаних з пандемією COVID-19 та військовим вторгненням. Розглянуто обмеження, з якими стикаються адміністрація та викладачі університету при впровадженні дистанційного навчання, та обговорено методи, застосовувані для подолання цих перешкод. Проаналізовано конкретні заходи ЛНУП, зокрема відновлення та вдосконалення системи управління навчанням Moodle, використання ліцензійних продуктів Microsoft, впровадження електронного журналу, автоматизованої системи планування навчальних планів, створення електронної системи затвердження документів. Окремлено запровадження та практичні аспекти таких ініціатив в університеті.*

*Дослідження зосереджено на таких ключових поняттях, як дистанційне навчання, вища освіта,*

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*Labster (платформа віртуальної лабораторії), LNEU, Microsoft Teams (інструмент спільного спілкування), Moodle (платформа навчання з відкритим кодом) і віртуальна реальність. Досліджуючи ці сфери, стаття проливає світло на досвід і результати впровадження цих інструментів і технологій для дистанційного викладання та навчання у Львівському національному університеті природокористування. Результати цього дослідження сприяють ширшому дискурсу про дистанційну освіту у закладах вищої освіти, пропонуючи розуміння стратегій, які використовує ЛНУП для забезпечення неперервності освіти у складних умовах. Аналіз досвіду університету та використання різноманітних цифрових інструментів дають цінні уроки та рекомендації для інших навчальних закладів, які стикаються із складнощами дистанційного навчання.*

**Ключові слова:** дистанційне навчання, вища освіта, Labster, Microsoft Teams, Moodle, віртуальна реальність.

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**P**roblem setting. The current situation in the world is developing under the impact of a set of negative factors, which follow each other almost immediately. The COVID-19 pandemic, which began in China at the end of 2019, disrupted logistics in the world economy, suppressed global manufacturing and consumption, and exacerbated social and political instability around the globe. Coronavirus and its pandemic prompted lockdowns imposing in many countries, business closures as well as social distancing practices realization. All these measures abruptly changed many aspects of education, from the primary school to secondary and the higher one. The year of 2020 saw these trends unfolding spectacularly and altering everyday routine of work, education and leisure in the global scale.

The introduction and development of vaccines helped the Humanity to get in touch again with the fear for unknown virus subsiding to some extent in 2021. Though the virus frequent mutations had not been allowing for the people even in the most developed countries and regions to feel themselves completely safe out of coronavirus-caused illnesses throughout the whole 2021, the global pandemic impact upon politics, economics, societies etc. began to alleviate.

2022 showed another ruinous force, which, apart from the viruses and natural disasters, could still be posed by humans themselves, which was war. Russian invasion of Ukraine launched on February 24, 2022 has claimed, until now, dozens of thousands of lives and caused hundreds of thousands to be left with their hometowns almost totally destroyed. Millions were forced to become migrants or internally displaced persons. Ukrainian education has experienced something like a double-strike, both of them of biological nature, from scientific point of view. As a measure for

Ukrainian education to survive, distance teaching and learning have played crucial role. In this article the authors would like to elaboratively explain how the tools and measures of distance teaching and learning have been introduced and further developed through approbation at Lviv National Environmental University in 2020-2023 (Silenko and Kruk, 2022).

**Analysis of recent researches and publications.** Different aspects of distance learning and education were researched by many scholars and experts long before the COVID-19 pandemic and the Russian military invasion of Ukraine. The issues of distance learning were considered in the article of I.V. Liashenko in 2015, the experience of distance learning technologies approbation abroad, specifically, in European and North American countries were explained in the articles of B.I. Shunevych already in 2008. In them present study, the authors primarily use the experience of Lviv National Environmental University as to introduction and practical utilization of distance education technologies. In addition to that, the recent works of S.O. Kovalenko, V.M. Havii and co-authors on the problems and advantages of distance learning in high school, which were published in 2022 and the articles of A.O. Silenko and N.V. Kruk on distance learning as an alternative or an additional option for higher education in Ukraine (Silenko and Kruk, 2022) have been used. The authors of the research have also referred to the New York City Department of Education, and used the feedback on its experiences of implementing the program tools for online learning provided by Microsoft corp. All this informational background and the works of other scientific predecessors help to verify and outline what has been done in the corresponding sphere at LNEU (Microsoft, 2023).

**Task setting.** The purpose of this article is to explore the experience of introducing tools for distance teaching and work among professors at Lviv National Environmental University. The article aims to analyze the effectiveness of the applied tools and uncover practical aspects of their implementation.

The tasks of the article are as follows:

1. To investigate the implementation of tools for distance teaching and work among professors at Lviv National Environmental University.

2. To analyze the limitations faced by professors and University administration when implementing distance teaching.

3. To study the measures taken to overcome obstacles and optimize the distance teaching process.

4. To evaluate the impact of the utilized tools on student learning and professor work.

The following research methods were employed in the article:

1. Literature review: Analysis of the relevant literature and scientific articles related to distance learning and the use of tools for remote work at educational institutions.

2. Experience research: Study of the experience of Lviv National Environmental University in implementing distance teaching and utilizing specific tools.

3. Observation and interviews: Systematic observation and interviews with professors and students to gather feedback and insights on the use of tools for distance teaching.

4. Surveys: Implementation of surveys among students to assess the quality of learning and satisfaction with the use of tools for distance teaching.

5. Statistical analysis: Analysis of the survey results and student evaluations using statistical methods to obtain objective assessments.

These methods enabled an empirical research based on literature analysis, data collection, and statistical analysis, facilitating the formation of conclusions and uncovering the experience of introducing tools for distance teaching and work.

**Main results.** The implementation of distance learning at Ukrainian universities at the

beginning of the COVID-19 pandemic faced several main challenges, which could be differentiated into the following groups like (Babushko, 2023; Wong, 2022):

1. Technical limitations, which were experienced because many Ukrainian universities did not have the necessary technical infrastructure for conducting distance learning. Not all students and professors had access to stable Internet or to the personal computers with high-speed Internet. This created inequalities in access to education and made online classes more difficult to conduct.

2. Insufficient competence of lecturers, because many professors lacked proper training in teaching and generally working in online conditions. They were not familiar with the use of specialized platforms for distance learning and lacked the necessary skills for conducting distance classes, assessment, and feedback. Sometimes it caused partial decline in the quality of the learning process and loss of motivation among students. It also resulted in some deceleration of the learning process.

3. Distance learning provoked the feeling of social isolation among students, when they lost the opportunity to interact with peers and professors in person, exchange ideas, and solve educational tasks together. This could affect the motivation and quality of students' learning and also led to feelings of social isolation and loneliness (Kovalenko et al., 2022).

To address the issues, the University implemented the following priority steps:

1. Upgraded the technical infrastructure of the University. As a result, computer equipment was procured, and the Internet network was updated.

2. Conducted three training cycles for students and faculty professors to boost their skills of online using of Moodle, Microsoft Teams and Zoom Video Communications (Virtual Learning Environment of LNUP, 2023).

3. Introduced scheduled online meetings in Microsoft Teams for interest groups of lecturers and students to continue improving usage of their online education program instruments.

The phased development of distance learning methods and tools at Lviv National Environmental University can be depicted as follows (table).

**Phased development of distance learning methods and tools  
at Lviv National Environmental University**

Year	Implemented measures
2020	<ol style="list-style-type: none"> <li>1. Application of the Moodle platform was restored and since then it has been used. Moodle was first introduced at the University in 2004, but transition to a new version was conducted in 2020 in the time of COVID-19 pandemic (Moodle, 2023).</li> <li>2. Also, a contract providing free access to the online licensed Microsoft products for all students, staff, and faculty members of the University was signed.</li> <li>3. A pilot project was initiated to develop an electronic journal for tracking academic performance online. At first, it was used simultaneously with the traditional paper version.</li> </ol>
2021	<ol style="list-style-type: none"> <li>1. A modern local network was established between all academic buildings and dormitories of the University, utilizing optical network communication technologies based on Gigabit Ethernet technology with a nominal data transfer rate of 10 Gbps, which was aimed to meet the growing needs for Internet traffic of data for students, teaching and administrative personnel.</li> <li>2. An electronic journal for tracking academic performance was implemented and used without its paper counterpart anymore.</li> <li>3. An electronic depository catalog for the scientific library of Lviv National Environmental University was introduced for saving and stocking e-versions of the author's textbooks, manuals, course papers of students and their diploma papers.</li> </ol>
2022	<ol style="list-style-type: none"> <li>1. A pilot project of the original system for automated scheduling of classes was developed and introduced at the University.</li> <li>2. An original system for teachers' working hours distribution and allocation was developed and implemented.</li> </ol>
2023	<ol style="list-style-type: none"> <li>1. An original system for automated curriculum scheduling has been improved and implemented on regular basis.</li> <li>2. An electronic document approval system developed on the basis of Microsoft Office Tools has been introduced to facilitate the documents processing, and for coordination among structural units, administrative departments of the University as well as for the following documents final approval by the personnel and chairs of the units involved.</li> <li>3. An electronic catalog of defended students' course papers and course projects has been developed to boost the quality of the students' works and verify their authenticity in the future.</li> <li>4. The University's collaboration with the virtual laboratory Labster has been initiated with the prospects and expectations for the future introduction of Virtual Reality practices in the students' studying and even Augmented and Mixed Reality instruments in the prospect (Ministry of Education and Science of Ukraine, 2022).</li> </ol>

Due to implementation of the new technologies in the educational process, the University has gained the following advantages:

1. Increased efficiency, which is noticeable in implementation of the electronic journal for tracking students' academic performance, introduction of a system for generating students' class schedules, curriculum plans, distribution and allocation of teaching working hours, and introduction of the system, which allows for electronic documents to be approved online by the members of the University's chair personnel for time and process optimization. All the mentioned

measures have been introduced and implemented, and thus they are already reducing the time and efforts associated with managing and organizing the educational process at Lviv National Environmental University.

2. Improved accuracy and reliability. Using the respective and relevant electronic systems can help to avoid errors related to the manual data entry and ensures updating and reliability of the information used for making the necessary everyday decisions, and thus, today they are made or can be made faster and with better online data sharing options.

3. Convenient access to information. Electronic systems provide easy access to the required information anywhere and at any time, facilitating the work of lecturers, students, and administrative staff.

4. Transparency in document processing, teaching evaluations and students' performance. Today, at LNEU, Deans' offices, departments at faculties and administration personnel members who are responsible for the educational and methodical work can track academic groups' performance online, and, thus, interact more effectively. Students' attendance, their studying performance as well as lecturers' evaluation of students' performance are now being transparently followed and monitored by the personnel responsible for that at all of the involved levels. This provides additional tools for checking and supporting unbiased evaluation of students' academic performance and allows for automatic calculation of the semester students' performance grades and results by lecturers.

Proceeding from the existing, tangible and already functional and working accomplishments of Lviv National Environmental University in the sphere of distance education technologies development and implementation, the authors of the research have worked out plans for certain steps in the sphere of distance learning and teaching development at our University, which should be introduced and implemented in the future. These are the following measures to be taken:

1. Setting up the conditions and installing the necessary equipment for recording the lectures on LNEU's Moodle platform as well as on YouTube Platform. This means development and implementation of the lecture recording system in the University, which is done in a video format and then added to the recorded lectures in the Moodle system for further developing of the distance education at LNEU. It will provide the opportunity for uploading such recorded lectures onto the YouTube platform, as well. This will allow students to watch lectures at their convenience whenever they feel good for that, review materials, and revisit challenging concepts having an option for paying more attention to more complicated topics and subjects (Moodle, 2023).

2. Make use of Telegram Bots for Communication and Information Dissemination. De-

veloping and utilizing the proper Telegram chatbots to assist LNEU's students in obtaining the necessary and relevant information about different aspects of the educational process, in particular, receiving their class schedules, having access to self-studying materials, being informed about deadline by the corresponding reminders, and also having the opportunity to enjoy other available and useful functions online. Telegram chatbots can also interact with students, answer their relevant questions, and provide the necessary support.

3. Development and Implementation of Interactive Webinars. It is planned to establish a platform for conducting live online webinars in a variety of subjects, where students can actively interact with instructors, ask their questions on the subject. This will allow for the students to participate in group activities and gain some additional knowledge within and beyond their studying curriculum programs. Interactive webinars can also be useful for improvement of the lecturers' professional skills and deepening of their expertise in some interdisciplinary subjects of researches and study (Coursera, 2023).

4. Utilization of Virtual Reality (VR). LNEU is considering the development of a virtual learning environment that may enable students to interact with virtual objects, placing them in virtual reality situations, and finding oneself in virtual locations (Labster, 2023). Virtual reality can help to visualize certain complex concepts, create immersive learning environments, and provide practical experiences in a safe virtual space. This can be of great use for studying the leading world practices, knowledges and technologies as well as production and manufacturing processes in different branches and domains (Ministry of Education and Science of Ukraine, 2022).

**Conclusions.** The most important conclusion is the fact that a lot of work still remains to be done. However, many ideas have been already fulfilled in practice. LNEU has implemented practical distance learning tools for students like: Moodle, Coursera and the licensed Microsoft instruments, Zoom Video Communications and others. Electronic journal was introduced and tested for a year of 2020-2021, and now it has

been properly performing for two years of the educational process. LNEU, in fact, has completely stopped using the paper version of the students' attendance and performance monitoring journal. The University has recently implemented the system of electronic documents approval by LNEU's rectorat – which consists of a staff involved directly in the University's administrative decision-making process as well as deans' offices at the faculties. To have this system properly perform online, the Internet broadband connection has been improved significantly in 2021-2022. Lviv National Environmental University has developed further plans for future implementation, they are the following: online and recorded lectures room installation; social messengers, in particular Telegram chat-bots, to facilitate students' studying at LNEU from the organizational point of view; development and dissemination of the interactive webinars for students and

scholars; and, many others, like incorporating virtual reality technologies in the LNEU's educational process.

In order to reach all these goals and have these plans accomplished, Ukraine has to stay a sovereign, territorially integrated and independent state, and become a prominent member of the world economic, technological, scientific, political and humanitarian developing process. We all wish to live in Ukraine which is guarded by its military forces and nurtured from the inside and outside by the best practices of academic diligence and honesty in our country and educational system, in particular. To develop and strengthen its foreign educational relations, Lviv National Environmental University is actively working on casting the networks with many European and world Universities, and Institutions to make, among others, its distance teaching and learning program plans to become real as soon as possible.

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