MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

NATIONAL UNIVERSITY
OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

WROCŁAW UNIVERSITY OF ENVIRONMENTAL AND LIFE SCIENCES

MATERIALS

VII INTERNATIONAL SCIENTIFIC CONFERENCE

DIGITAL EDUCATION AT ENVIRONMENTAL UNIVERSITIES

April 15-16, 2021

Kyiv, NULES of Ukraine

Kyiv 2021

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2021

Recommended for publication by the Academic Council of the Faculty of Information Technologies of the National University of Life and Environmental Sciences of Ukraine (Minutes №9 of April 22, 2021)

Proceedings of the VII International Scientific Conference "Digital Education at Environmental Universities—Dnipro: Serednyak TK, 2021, — 29 p.

ISBN 978-617-8010-25-6

The authors are responsible for the content of the publications.

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SESSION 1. DIGITALIZATION OF EDUCATION: CURRENT STATUS, TRENDS, CHALLENGES

THE DIGITAL TRANSFORMATION OF EDUCATION: CHALLENGES FOR UNIVERSITIES DURING THE PANDEMIC

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The coronavirus pandemic has caused an intense transformation of educational processes towards digitalization. It turned out that the presence of a developed IT infrastructure in educational institutions is not a necessary condition for their effective implementation in the educational process during distance learning. The first and most important factor was the digital transformation processes of the university's management and personal digital competencies of teachers who needed to develop in the direction of using IT for remote work with students, faculty.

In terms of blended and distance learning to manage the educational process, directly teaching and learning, the formation of skills of the future, it is necessary to form an educational space based on modern digital technologies. The development of such technologies, their effective use for the organization of the educational process, monitoring its implementation, has become a priority for higher education institutions in the difficult times of the pandemic. An E-educational environment of the educational institution, which contains the necessary resources and services for learning - has become a necessary condition for the systematic implementation of IT in the educational process and the establishment of appropriate communication between participants in the educational process.

NULES of Ukraine was sufficiently prepared for the challenges posed by quarantine due to the coronavirus pandemic. The educational space for students is based on the use of the Moodle platform as a learning portal, where all subjects have a comprehensive resource in the form of an e-learning course, which is currently more than 1,600 units. Access to the portal, which is available to all students and faculty of the university, was supplemented by communication services. For instant communication, distribution of messages - messengers Viber, Telegram. Cisco Webex, Zoom, and Google Meet synchronous communication video conferencing systems were used to conduct online classroom sessions. For the organization of teamwork, project work - cloud services such as Microsoft Teams.

In order to create a personal educational environment for the student, his / her learning trajectory is supplemented by resources for non-formal education - open online courses (MVOK) offered on various technological learning platforms, such as Prometheus and Courser.

In order to quickly adapt teachers to the new conditions, NULES of Ukraine organized a series of advanced training courses "Distance Education Tools", program which included all the basic technologies for online learning, the result of such training is mastering more than 300 research and teaching staff (NPP) new tools and their successful use later in the educational process.

However, natural sciences universities cannot fully organize the educational process for many specialties exclusively remotely. Much of the professional competencies cannot be formed exclusively in the virtual environment, although virtual laboratories, video resources for training, video studios for recording bulk video content are being introduced. Still, we are forced to transfer part of the laboratory work to the classroom format and change the schedule of the educational process.

We all expect a quick return to the traditional organization of the educational process, but we already understand the inevitability of digital transformation processes in the teaching and management of the university, but which will not be forced by emergencies, but will be an evolutionary step in improving university management.

E-LEARNING DISTANCE LEARNING RESOURCES

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Abstract. The development of electronic educational content is rapidly developing. It is officially declared at the UN and UNESCO level that in the presence of high-quality educational content and developed methodology of the educational course, the effectiveness of the electronic form of education corresponds to the effectiveness of the traditional full-time form. The UN also states that access to the Internet provides fundamental human rights to an open information and educational space, "which disseminates thoughts, ideas, information, knowledge and allows people to communicate and interact socially." But today this issue is of particular relevance. The COVID-19 pandemic has dramatically changed our daily lives and forced the world to adapt to new conditions.

Traditionally, the educational system was built on the direct interaction of teacher and student in the classroom. However, the development of technology and digital space - especially in the last 20 years - have changed our view of education, and forced lockdowns have accelerated the process of digitalization of society and education in particular. New methods of acquiring knowledge stimulate our ingenuity and develop the ability to initiate change and successfully cope with it.

Massive open online courses, electronic textbooks and manuals, video courses and video lectures, electronic and interactive workbooks play an important role in the context of distance education. Their use allows students to study anywhere and anytime.

A number of researchers argue that the use of distance learning in higher education in the long run is more cost-effective than traditional learning.. It is important for the university to have sufficient resources and conditions to be able to apply and use e-learning courses. And this is a common problem! To that end, the establishment of electronic lighting content, the equipment and technical staff, who organize and ensure the functionality of the complex - it is necessary conditions for development of distance education, which includes a wide range of technologies and learning strategies.

After all, in the remote format of work with students, it is important to combine distance education with traditional interaction through external communication services; ensure synchronicity in the virtual audience; work in social networks with students; create electronic educational content; manage the interaction of participants in the educational process.

Thus, due to the widespread introduction of distance education in higher education, the traditional roles of students and teachers have changed. Students from passive recipients of knowledge have become active participants in the educational process, who are independently responsible for generating the information they receive from the teacher. At the same time, the teacher ceased to be just a translator of knowledge, and became a tutor who guides, supports and motivates students, while relying on technological tools. Researchers of the current state of education claim that the teacher no longer has a monopoly on knowledge. Digital technology has taken it away.

At the same time, the burden on the teacher has increased. In China, more than 10 years ago, the process of calculating the increased resource consumption of such a process began, and our teachers did not have time to reschedule work in terms of distance education. In order to facilitate teachers' work in the new conditions, the Scientific and Methodological Center for Higher and Pre-Higher Education has activated the work on creating electronic educational content, which is placed in the Media Library of electronic teaching aids. The number of users of this electronic educational resource has increased many times. We had to start the process of improving the resource, which is still ongoing and in the new school year, educators will receive a modern and more rational educational resource. We will soon start creating mass open online courses (MOOC). We invite all participants and guests of the conference to participate in the work on creating modern electronic educational content.

DIGITAL COMPETENCE AS A NECESSARY CONDITION FOR DIGITAL TRANSFORMATION OF EDUCATIONAL AND SCIENTIFIC ACTIVITIES

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Abstract. The main results of a completed research conducted by the Institute of Information Technologies and Learning Tools of the NAES of Ukraine on the problems of forming competencies of educational process participants based on cloud-based information and educational systems. Namely: "Adaptive cloud-oriented system of training and professional development of teachers of general secondary education institutions"; "System of computer modeling of cognitive tasks for the formation of students' competencies in natural and mathematical subjects"; "Methods of using open electronic scientific and educational systems for the development of information and research competence of scientific and pedagogical workers". The developed and tested methodologies, teaching materials are presented. The system-forming factors of a complex of scientific researches are: the general purpose; the common and basic methodological fundamentals of the research (system-, competence- and project oriented approaches); the complex character of their simultaneous carrying out and implementation; the interdependence of the basic final results (formed digital competencies of participants of educational process); cloud computer-technological platform for research and implementation of educational applications.

The relevance is due to the general trends of implementation of ICT / digital technologies in the educational process, in particular, increasing attention to their conscious, competent use to solve various educational problems.

The combination of complementarity and multi-vector research is a defining feature of research work. General purpose: to substantiate theoretically the scientific and methodological principles of design and implementation of cloud-based information and educational systems for the formation of competencies of participants in the educational process. The processes of general education of students, training and advanced training of teachers and scientific and scientific-pedagogical workers of scientific institutions and institutions of higher education were subject to digital transformation.

Keywords: Digital transformation; digital competencies; students' competencies; teachers' competencies; scientific and pedagogical workers' competencies; scientists' competencies; Institute of Institute of Information Technologies and Learning Tools of the NAES of Ukraine; cloud-based tools; information and educational systems

ARTIFICIAL INTELLIGENCE PARADIGMS IN SMART EDUCATION AND LEARNING SYSTEMS: TECHNIQUES, APPLICATIONS AND CHALLENGES

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Abstract. The concept of smart education in scientific research is considered as the most relevant and important stage of digitalization of the educational sphere. Smart education involves a comprehensive modernization of all educational processes, as well as methods and technologies used into this process. The term "smart" is often associated with the technological aspect and the emergence of smart technologies (STs) in education, including smart boards, smart screens, smart course, and a wide range of smart tools. With the development of STs, learning platform got an opportunity to react to individual learner data and adapts educational resource based on cloud computing, data engineering, artificial intelligent and big data analytics, Smart educational systems have a high potential in the field of content customization and individualization of learning paths, provides students with an opportunity to implement their own leaning style. Moreover, the educational process thanks to modern intelligent solutions can be carried out anytime, anywhere in the smart education context by using the artificial intelligence paradigms. In turn, from a managerial point of view, the development of STs leads to the emergence of new educational strategies and models as well as development of smart and adaptive learning environment in order to increase the quality of education.

Currently, artificial intelligence (AI) paradigms have been proposed by the knowledge engineers for developing a smart education and learning systems. These paradigms offer intelligent concepts, theories, algorithms, and techniques that can help solving problems in a variety of education / learning/training tasks and domains. This talk discusses the different AI paradigms that have applied for developing the new and efficient generation of smart tutoring and learning systems. The talk presents three AI paradigms, namely; case-based reasoning, information mining, and ontological engineering. Moreover, the talk presents the challenges facing the software developers and the knowledge engineers in developing such systems. In addition, the talk presents some examples of the results of the author and his colleagues that have been carried out in recent years on developing such systems.

CREATING EDUCATIONAL CONTENT USING H5P AND INTEGRATION IT WITH MOODLE`S COURSE

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Abstract. The use of interactive learning material provides more space for involving students in the learning process. Because passive absorption of information turns into a low percentage of its assimilation. One-sided lecturing by a teacher has long been an outdated anachronism. We use the involvement of students in the discussion through questions, discourse, reflection. But how can this be used in e-distance learning, in which we are all forced to find ourselves now because of the COVID-19 pandemic? In fact, now is a great time to develop new technologies while attracting new forms of learning and self-development. And using existing web technologies, we can not only provide students with educational material, but also actively involve them in action. Provide them with tools that create a mix of theoretical

and practical training. And this prepares platforms for the emergence of new pedagogical methods.

The development of students who are focused on self-study and creative approach to their development has been and remains a priority in education. The time of pandemic and permanent quarantine encourages students and teachers to make more active use of distance learning methods. This means further strengthening the role of self-learning and self-organization. We should not to lose the student's interest in learning the material, then he must be involved in active action. In the process of reading the text, he can has questions and immediately check the answer. Show the scheme of the subject of study with the disclosure of nuances dynamically immediately on the scheme. Prepare an educational video with interactive inserts that will involve the student in the plot of the story, require active interaction with the material.

Such interactive learning is already a popular and proven method in the world. However, previously it was necessary to involve expensive software, designers, programmers and other specialists to create it. H5P (h5p.org) greatly facilitates this process. Provides teachers with the opportunity to express their own creativity by creating an effective educational product. For students, this becomes a significant expansion of their learning space.

H5P is an abbreviation for HTML5 Package. This technology is an open source software and free. This allows teachers create and share their learning products within the community. And the use of the new HTML5 standard allows you to create user-friendly content for large screens and mobile devices. Most importantly, teachers do not need special technical knowledge to create teaching materials using H5P.

There are many different types of content to use: case studies scenarios, interactive technical demonstrations, 3D images with areas for detail (hotspots; rollover information; animation), and quizzing in various formats; fill in the blanks, drag on the image or text, mark the word, assign interactive video and branching. In total, there are 46 types of educational content today. And new ones are created.

Training materials can be created immediately on your elearning site (this requires the installation of integration modules), in the commercial cloud h5p.com or in the desktop program lumi. Materials created in lumi can be uploaded to your site or shared with others. Materials created and stored on h5p.com can be embedded in any site.

H5P content can be easily distributed and integrated into multiple learning management systems (Canvas, Moodle, Blackboard, etc.).

Students receive comprehensive automatic feedback, and their interaction with H5P activities can be tracked by teachers. H5P can be used in a wide range of learning contexts and subject areas.

Keywords: Online learning, video-based classes, moodle, H5P interactive content

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THE MODERN TOOLS FOR ONLINE VIDEO-BASED TEACHING AND LEARNING

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Abstract. Online teaching is one of the current trends in the education around the globe. It provides effective alternative to real classroom teaching that is demanded under the current pandemic conditions. In the last year, every lecturer all around the world have faced the issue of use the digital tools for online lecturing. Regarding the statistic of Google Trend, the online teaching search was increased from 30 to 100 interest rate since January 2020 to the end of March 2020. Because of demands, many new instruments and software were developed and offered for universities for online teaching and learning. Nevertheless, how to find out the best one? There are a lot of discussion and researches about different instruments and methods of the online teaching and learning. However, there is a research that conform the video based teaching is more effective than traditional. According to a recent survey, 78% of students already use video platforms like YouTube to teach themselves new skills or acquire knowledge. To help achieve the study approach, multiple sources of data were obtained, including work experience at the Weihenstephan-Triesdorf University of Applied Science, interviews with experts in modern teaching, lecturers that use video-based classes, literature review, and official webpages of tools description for video making.

There are a lot of discussions and researches about pros and cons of online teaching and learning, challenges and effectiveness. Some studies have shown that the use of short video clips allows for more efficient processing and memory recall. The visual and auditory nature of videos allows students to process information in a way that is natural to them. There are a number of specific points that have to be followed in case of video creation:

- Limit videos to about five minutes or less, unless you are trying to relay a great deal of information.
- Maintain a conversational and enthusiastic tone to keep learners engaged.
- Properly balance auditory and visual elements throughout.
- Break videos into short segments by topic or theme.
- Include interactive and responsive features, such as a short quiz, to promote reflection and ownership.

When using video clips in the classroom, shorter clips (around five to 10 minutes) help students learn the information without being overloaded or losing their focus. If it is needed due to the subject, longer videos are also effective — however, their total length should typically be limited to no more than 30 minutes. Showing video clips in short segments and keeping the total length contained to a concise running time helps to keep students engaged. Using captions and subtitles with videos has also been proven to be effective in helping students access and process information. This is especially important when considering diverse student populations, including those with special needs. Of course, the videos have to be created quality educational.

There are most popular tools for video-based online teaching: Zoom, Cisco WebEx, Google Hangouts Meet, YouTube, Panopto. These tools possible to divide into two groups: synchronous video communication tool and asynchronous video communication tool. To the first group belong: Zoom, Cisco WebEx, Google Hangouts Meet. This type of tool enables two-way conversations in real-time. In addition to sharing audio and a webcam video, meeting participants can also present live video of their screens. Panopto is designed for asynchronous video communication, enabling the creation and sharing of on-demand videos and screen

recordings, as well as one-to-many live streaming. The other is a YouTube-like video platform with a consumer-ready solution for hosting and sharing recorded videos you would not want to upload to YouTube.

The comparable analysis of tools from different groups will help to answer the question which is one of named tools has to be used for what cases.

Video and Screen Recording. Zoom can be used as a screen recorder. The recording can be saved to owns computer or to the Zoom recording cloud. The network interruptions can affect the quality of the recording with Zoom. Panopto supports recording from multiple video inputs, multiple screens, and multiple devices into a single video — it then syncs all of owns video content in the cloud. Panopto includes desktop and mobile apps for recording as well as a new online screen recorder, giving the user the flexibility to create videos from both online or offline.

Editing Recording. Zoom gives you the ability to trim unwanted content from the beginning and end of your recordings, which is often sufficient for removing dead air while everyone gets situated on a video call or cutting off-topic conversations from the end. If you need to edit more than the tails, you can download your Zoom recording and polish it up in any video editing application, including Panopto. In Panopto, you can go straight into editing right after you finish recording, and you don't need experience using advanced video editing software either.

Life streaming. Zoom can easily be used to live stream communications, presentations, and lectures to smaller groups. Because Panopto streams asynchronously (with a slight delay of up to 40 seconds) and records at the same time, viewers are able to join at any time, pause and resume, and rewind to re-watch part of the live stream as it's happening. The asynchronous live streaming environment in Panopto delivers a curated experience that's ideal for large online lectures and presentations, while also enabling viewers to comment and ask questions via chat to which the presenter can respond.

Sharing the video Recording. Whether you're one person or an organization with thousands of Zoom users, manually sharing recordings from Zoom hinders productivity and presents significant challenges to securing confidential information and intellectual property. It may also require waiting up to 72 hours for your cloud recording to process and become available in Zoom. Every video uploaded to Panopto is set to private by default and secured in your organization's video library. Simply click the sharing button under your video in Panopto and choose how you want to share it — you can even have Panopto email specific viewers for you with the link to view it.

In summarizing, Panopto offers more flexibility in recording videos, advanced video editing tools and easier workflows to securely archive, search and share videos online. In addition, Panopto offers an enhanced viewing experience that engages students and allows for collaboration that is more flexible. When live two-way conversation is not required, the Panopto use is more efficient for any of the following:

- Asynchronous learning and teaching for knowledge and information transfer.
- Live streaming for a large audience
- Record lectures
- Creating flipped classroom videos
- Creating microlearning videos
- Creating video documentaries
- Student video projects, presentations and performances
- Sharing video tutorials, demonstrations and guides
- Providing assessments and feedback
- Recording training videos
- Asynchronous meetings and collaboration.

Zoom is made for live, interactive video conversations and meetings. It is better to use Zoom for collaborative sessions where participants all benefit from contributing and discussing their ideas in real-time:

- Synchronous learning
- Live, interactive lectures and training sessions
- Group discussions and breakout sessions
- Role-play and scenario-based learning
- Synchronous meetings and collaboration
- Live meetings and collaborative sessions
- One-on-one conversations and calls
- Interactive coaching sessions
- Live presentations to smaller groups where real-time discussions are desired
- Broadcasting live communications and other events to smaller audiences where interaction is encouraged

The benefits of using videos in an educational setting are numerous. Their convenience and versatility make them an asset to students, teachers, and educational institutions alike.

Benefits to students: videos create a more engaging sensory experience than using print materials alone; they provide a go-to resource that can be watched from anywhere with an internet connection; videos increase knowledge retention, since they can be stopped and replayed as many times as needed**;** they greatly assist in the learning of all subjects**,** but particularly those topics that are complex and/or highly visual, such as step-by-step procedures, problem-solving, or science and math formulas; they increase proficiency in digital literacy and communication. *Benefits to teachers:* Video increase student engagement which in turn helps boost achievement; they offer the flexibility to pause, rewind, or skip throughout the video to have class discussions or review particular areas; they enable teachers to create a flipped classroom or "blended" learning environment; Digital videos facilitate remote learning opportunities so that teachers can reach students from all over the world; many videos now contain analytics features that enable teachers to track student engagement and attendance while viewing; they provide opportunities for student feedback and assistance through video; videos seek to change the roles of teachers from lecturers to facilitators. There are benefits for university as well: great potential to improve marketing and communications; more flexible faculty and staff training; ability to record campus events for live or on-demand viewing; ability to increase online course offerings; digital videos can be integrated into your institution's learning management system (LMS)**;** increasing campus accessibility through videos conveys an attitude of positive public relations to parents, potential students, and alumni. This can attract potential students and is a powerful recruiting tool; the use of videos in education shows a high return on investment (ROI) in those universities that employ a tool to measure it.

Keywords: Online teaching and learning, video-based classes

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SESSION 2. DIGITAL EDUCATION AT ENVIRONMENTAL UNIVERSITIES: INTERNATIONAL EXPERIENCE

INTRODUCTION OF DISTANCE MODE OF EDUCATION AT COVID-19 LOCKDOWN IN UZBEKISTAN: CASE OF SAMARKAND BRANCH OF TASHKENT STATE UNIVERSITY OF ECONOMICS

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Abstract. In connection with the coronavirus pandemic, universities of Uzbekistan have sent students on compulsory leave since March 16, 2020. The introduction of pandemic quarantine, as in other areas, has set new tasks, new challenges for representatives of the higher education system - management, professors, students, and ordinary workers. The long-expected distance education system suddenly began to develop.

To ensure the continuity of the educational process of students and distance methodological support of student education, from April 1, 2020, the Samarkand branch of TSUE has fully established a distance learning system in the subjects of the spring semester.

The Moodle e-learning system (https://e-books.sbtsue.uz/) is equipped with electronic resources and educational materials for 134 subjects in 6 undergraduate directions, and online classes are conducted by professors and teachers of the branch.

Besides, professors and teachers organized Telegram channels in each group following the schedule. Electronic resources on the subject are regularly posted on the media portal of the Ministry of Higher and Secondary Special Education https://tube.edu.uz/ and the pages of the branch at https://www.youtube.com/.

The branch started training courses in modern programming languages in the form of meetings and video conferencing seminars through the ZOOM platform. More than 2500 electronic resources were received from the IRC TSU, which is posted on the distance-learning portal http://e-books.sbtsue.uz/. An electronic library has been launched with separate web addresses.

The share of teachers registered in the distance learning system and attached to the disciplines of the Samarkand branch of TSUE is 100%, the share of professors and teachers actively using the system is 86%, the share of students registered and attached to the system is 100%, the share of students actively using the system accounted for 94.2%.

A survey conducted among students from March 25 to 30, 2020 showed that 55.2% of our students had a personal computer, 6% had a tablet, and the rest of the students used the educational program via smartphones. The dean of the faculty and group leaders managed individual interviews with students and their parents to explain the relationship between the technical opportunities of distance learning and the quality of education. Most students use a personal computer or tablet all the time.

In addition to the distance learning platform in the form of video, audio, and PDF, teaching materials are also posted on the Telegram network, given that some students cannot regularly attend classes due to Internet access problems in remote areas and provinces, remote villages. There is a system of individual work with students who do not have the opportunity to fully participate in distance learning. With them, mainly through the Telegram network, educational materials were delivered and assignments were created, creating conditions for independent learning. By the decision of the Branch Council, in connection with the cancellation of quarantine restrictions, additional classes and attestations were carried out

according to an individual schedule for all students who could not master during the holidays and at the beginning of the 2020/2021 academic year.

The Samarkand branch of the Tashkent State University adopted a temporary regulation on the system of monitoring and assessing students' knowledge in the process of distance learning.

The assessment of student's knowledge in distance learning was carried out by completing assignments (using Lectures, Video Lesson, Questionnaire, Chat, Forum, Glossary, Database, Scorm / AICC, seminar, survey, test, homework, Wiki, feedback, and other teaching aids and their control for performance indicators of the student's educational platform), intermediate and final control. Classes and assignments in the class were carried out on the basis of a schedule with the participation of a student on the distance learning platform adopted in the university.

The student's progress in the practical, seminar, laboratory classes, and independent study assignments, as well as his/her activity in these classes, were assessed by the teacher on a distance learning platform. The final type of control was carried out at the end of the semester to determine the level of assimilation of theoretical knowledge and practical skills of the student in the relevant subject.

The Samarkand branch of Tashkent State University has developed a temporary ORDER about re-training of missed lessons in the process of distance learning students, approved by the decision of the council and implemented in practice.

When working with a student who could not follow the subject, the reasons for the student's failure to complete the subject were identified in the following system:

- Attendance by students of the distance learning platform;
- The state of the student's fulfillment of practical tasks in distance learning;
- Assessment of practical lessons and midterm exams and the status of their passage;

The reassessment of students' knowledge is carried out according to the following system:

If the student has not participated in the distance learning platform during the semester, he/she switches to the independent distance learning process and independently studies topics related to the subject. After comprehending the topics, it is allowed to take intermediate and final exams;

students who fully participated in the distance learning process and did not pass the intermediate exam are allowed to re-take before the final exam;

students who fully participated in the distance learning process, passed the intermediate exam and did not pass the final exam, are allowed to re-take within one month after the final exam;

It is allowed to take the final exam up to 3 times, a student who has not passed 4 subjects of the final exams is not allowed to retake.

The pros and cons of this implementation of distance learning process:

– the Internet does not work evenly throughout Uzbekistan;
– the unpreparedness of some professors and teachers for distance learning;
– there were deficiencies in passing exams due to interruptions in the Internet connection, which, in turn, affects the exam results.

The positive aspects of accelerated implementation of distance education:

– formation of students' skills of independent work, study, research;
– thousands of video lessons with a volume of hundreds of GB have been created at each university;
– professors were allowed to create, research - freedom (in the process of ordinary education, the professor was not free from paperwork);
– organization of online lessons (online video communication) using modern software.

During the student holidays due to lockdown, professors and university staff were taken on leave. With the introduction of education on distance, based on the recommendations of the Ministry of Higher and Secondary Specialized Education on the effective organization of the activities of teachers and employees of educational institutions, professors and teachers were transferred to remote work.

Professors and students quickly responded to the quarantine requirements caused by the coronavirus pandemic, and teaching and learning activities were launched in the new environment.

Keywords: distance education, Uzbekistan, Moodle, quality assurance, student assessment.

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INFORMATION AND COMMUNICATION TECHNOLOGIES IN APPLICATION, DISSEMINATION AND EVALUATION OF ERASMUS+ JEAN MONNET ACTIVITIES

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Abstract. Currently education systems are increasingly embedding digital competencies in their curricula. These trends became more relevant with regard to the COVID-19 disruption when most educational institutions were forced to discontinue or transform the educational process. The appropriate level of education, relevance and competence of educational programs to the request of society determine the future in the internal and external labor market. In addition to the pandemic impact, strategic integration of Ukraine into the European Community is one of priority of development, determined by its close geographic location and interaction in trade, first of all by agricultural produce. Serious gaps in training curricula of the future veterinarians and poor awareness of the food safety concept and the key aspects of the EU official food safety control in Ukraine was the key reason of development of Jean Monnet Module “EU Food Safety Control”.

Objectives of the current research was to assess outcomes of the Erasmus+ Jean Monnet activities and value the role of ICT in achieving the project results: the effect of teaching activities, dissemination effect of open events, and overall assessment of relevant project outputs by action priority matrix, judged on the basis of strategy for the dissemination and exploitation of results for Jean Monnet projects. Comparative analysis of the implementation

strategy for blended learning stage (before spring 2020) and distance learning under the COVID-19 disruption was made. Tools and the degree of involvement and satisfaction of participants in the project outputs were determined.

The impact of each project outcomes and effort involved were scored and plotted in the impact effort matrix based on the effort required to implement and the impact they have. Actions taken with ICT were the best for achieving project result.

Keywords: Erasmus+ Jean Monnet Project, Information and Communication Technologies (ICT), Food Safety Competence, Evaluation, Education.

DIGITALIZATION IN AGRICULTURE: PROS AND CONS

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Abstract. Agriculture faces numerous and various challenges. The working force available for animal and plant production has been decreasing steadily over the last decades while the complexity of machinery has increased and requires advanced skills for operation. The amount of food, feed and energy that needs to be produced to fulfill the basic needs of end consumers grows along with the world population. With the acreage available for plant production staying steady or decreasing, productivity needs to be improved closing the gap between actual and potential production. In parallel, plant production needs to adapt to climate change being a worldwide phenomenon which is mainly expressed in changing intensity and distribution of rainfall. Last but not least, the societal pressure on agriculture to minimize negative impact on the environment and animal welfare is increasing. Different tools allow to tackle the above mentioned challenges, breeding new varieties and developing alternative protein sources like cultured meat being two valid options. Further introducing digitalization is another option which may help to solve some of the above mentioned issues. Supporting operators on tractors and self-propelled machinery with Automatic Steering and Section Control Systems is a widely accepted and adopted technology which erases inefficiencies caused by overlaps and gaps during all operations. This technology is ready to even replace the operator being a scarce resource as well as a source of error when it comes to steering and switching implements on and off. However, cultivation, seeding, spraying and fertilizing require an analog control when aiming to adapt to local variations of soil and plant requirements. Understanding the causes of local yield variation is complex and hard to derive with digital tools only. The digital data available (yield maps, soil maps, nutrient maps, satellite images) need to interact with human knowledge for deriving an optimized strategy. This interaction requires employees which are well trained in the realm of plant production and digitalization and a substantial amount of time for proper analysis and validation. The limiting factor for applying digital tools in agriculture with the aim of increasing economic welfare and reducing environmental impact on a stable area of land with less employees are time and appropriate educational programs.

Keywords: Agriculture, Digitalization, Education, Cost Structure

PHYSICS TEACHING AT ORAL ROBERTS UNIVERSITY DURING THE PANDEMIC TIME

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Abstract. Oral Roberts University (ORU) is a private evangelical university in Tulsa, Oklahoma. Founded in 1963, the university is named after its founder, evangelist Oral Roberts, and is accredited by the Higher Learning Commission. Sitting on a 323-acre (1.31 km2) campus, ORU offers over 70 undergraduate degree programs along with 20 graduate programs across 6 colleges. ORU is classified among "Baccalaureate Colleges: Diverse Fields". ORU is a liberal arts university and Engineering is one of the most popular majors among ministry and leadership, nursing, psychology, and business administration. The university enrolls approximately 4,000 students.

In today's changing educational environment around the world, teaching engineering disciplines is becoming a challenge for teachers and students. The Physics at Engineering Department seeks to provide students with the knowledge, skills, and experiences that will prepare them to enter directly into professional practice as Christian engineers, or into advanced studies in engineering, or other professional areas. This training equips students in the application of physics and science for the improvement of the physical world and enables graduates to enter the engineering and scientific communities and contribute to the healing of the human condition.

During the Physics Labs classes there are required materials for the class consist of integrated and flexible Manual for Engineering and biology directions. Even during the pandemic time, the course is still very high paced and intense consisted of 9 laboratory experiments.

At ORU being doing embracing innovation is. ORU does not limit its focus to academics. Instead, the university aims to expand the mind, body, and spirit of students to help them maintain a high level of achievement post-graduation. ORU is also committed to enabling access to higher education to people all around the world. Our goal is to be able to connect to students in all 195 countries globally. Five years ago, we were at 75 countries, now we have increased that number to 114. To help students reach their full potential whether they are on-campus or on the other side of the world, ORU is always looking for innovative ways to harness new technologies.

For Home-bound or quarantine students we use Kubi telepresence robot manufactured by Xandex Inc. in Petaluma, California. The unique advantage of Kubi for Distance Learning is that it lets the student easily look around remotely with 300 degrees of pan and 90 degrees of tilt to see and interact with teachers, other students, school nurses, and coaches through remote robotic control during a video call. Kubi provides remote students and teachers with a highly engaging virtual presence in the evolving 2020-2021 classroom without being physically present. Kubi can also be wheel mounted for even easier portability which allows home-bounded student to “walk” with their classmates to different activities.

To bring together its data-driven student services, ORU relies on D2L’s Brightspace learning management system (LMS), which plays an integral role in our ability to offer digital courses and learning materials seamlessly, which is vital for our online students. We see Brightspace as a world leading LMS, and our students and faculty alike have embraced the platform.

All assignments (Pre-lab questions, lab reports, post lab questions) should be submitted through D2L Dropbox so the professor are not dealing with the paper materials.

To ensure Lab safety special protocol being adopted. Students being divided in groups of four. Two students being in class and two students are joining group remotely each next week roles will be switched. Each student attends lab every other week while live streaming data and information to their lab partners using ZOOM Breakout rooms. All students complete and submit all assigned labs using the standard lab schedules and assignments. During the pandemic time students have the responsibility for personal health safety requirements which includes wearing face masks at all times, using disposable gloves at all times, cleaning surfaces before beginning any work, assigned students should operate commonly used equipment that requires touch (computers, instruments, etc.) on specific lab days, the university has provided hand sanitizer stations throughout the campus, professor do demonstration projected on big screen TV in Instructor Safe Space. After completing experiment students send results through e-mail, D2L, Zoom for approval and leave classroom to finish analysis and after lab questions either at home or in big adjacent auditorium to reduce possible exposure time. Professor stays in the classroom or go to office work and will be available through Zoom until official lab time is over to answer questions.

Another safe option we tried in our physics laboratory classes is “e-Science” Labs: comprehensive, tactile lab kits with engaging digital lab curricula offering 18 PhD-developed, ADA-, and WCAG 2.0-compliant courses, which provides authentic lab experience for on-line leaners. Instructors register on “e-Science” website and receive instructional resources (lab reports templates, test bank and laboratory manuals)

Each student receives personal set of experiments, which he/she performs at home and enters results in lab report. All instructional materials, including exams are easy to integrate with LMS for one easy access from University web site.

Students were able to study effectively in a complicated, dramatically changed learning environment and engage actively with instructor and peers during lectures and laboratory experiments.

As the result we maintained participation, retention and grade rates on the same level as pre-COVID rates and got praises from numerous students in SOS (Student Opinion Survey) not only for moving classes online effectively and smoothly, but also for making classes “fun and keep us(students) from being bored during quarantine”

Keywords: Physics Tools and Practices; Pandemic time; Engineering Physics, Distance Learning, Online Platform

E- LEARNING RESOURCES OF REMEDIAL TEACHING FOR CHEMISTRY AT WUELS

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Abstract. The study was aimed at identifying problematic areas of chemistry, which in the future are the basis to prepare open educational resources (OER) focused on these problematic areas. The basis for the analysis was the survey, which included questions prepared by teachers of chemistry. Four areas related to teaching chemistry were examined: students' skills, students' knowledge, topics in inorganic and organic chemistry that are difficult for students. Descriptive statistics were used to analyze the survey results, carried out in several steps: data acquisition, general analysis to assess the development of practical skills based on

theoretical knowledge among students, cluster analysis to distinguish coherent area for OER, statistical assessment of skills and knowledge, identification of the relationship between different competences. Based on the survey, 80% of the teachers pointed out the organic chemistry as a problematic area. 60% of respondents highlighted lack of skills among the students and 40% - lack of knowledge. The analysis showed that 80% of OER content should concern topics of the organic chemistry, and 20% of the inorganic chemistry. 60% of learning objects should develop practical skills: solving problem, units converting, writing formulas, write equations, interpreting results and observation, identification of compounds on the basis of their structure. 40% of teaching objects should cover the knowledge:gaps such us characteristic reactions, properties of elements and compounds and their symbols. It was found that there was no correlation between the number of hours of lectures (theoretical knowledge) and the identified difficulties of students. Therefore, it can be concluded that the improvement of the learning outcomes will be achieved by students through their own work involving the exploration of knowledge as well as practicing and consolidating skills, in which open resources in chemistry may be helpful.

Keywords: remedial teaching, educational open resources OER, educational needs of students, recommendations for OER designing

DIGITAL SKILLS. INTERNATIONAL BRIDGE - FRIENDSHIP "GUIDE 2020: NEW OPPORTUNITIES AND PROSPECTS".

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Abstract. Covid-19 has literally turned the tourism business upside down. 2020 has been a disastrous year for many tourism and travel entrepreneurs.

As soon as the pandemic came, guides, travel organizations and associations immediately had a lot of questions: How now to earn a living? How to conduct excursions? Where can you apply your experience? How to digitize and convey myths, legends and stories - which were collected by tourist guides studying, exploring their route? How to enable tour guides to remain in the profession?

On August 20, 2020, the online marathon “Bridge of Friendship. Guide 2020: New Opportunities and Prospects”, organized jointly by the Institute for Tourism Development under the State Committee of the Republic of Uzbekistan for Tourism Development, the World Federation of Tourist Guides Associations (WFTGA) with the technical support of the National University of Bio resources and Nature Management of Ukraine and the Public Association“ Nudge Ukraine ”.

The marathon was scheduled for 5 panel discussions, as well as webinars and master classes, which touched upon topics important for guides:

- new requirements for the profession after the pandemic;
- VR and digital marketing in the guide's activities;
- improving digital skills and much more.

After the online marathon, the guides offer potential tourists online excursions on Zoom, Skype and Youtube live. The format and subject matter are different: someone uses interactive Google Earth maps and street panoramas, someone shows videos and archived photos, someone uses quarantine exemptions and goes out with a go-pro camera or an operator to conduct online broadcast.

Keywords: digital skills, digital marketing, online marathon, GUIDE 2020, nudge.

SESSION 3. DIGITAL EDUCATION AT ENVIRONMENTAL UNIVERSITIES: SUCCESSFUL PRACTICES

EDTECH LANDSCAPE IN UKRAINE: SMART EDUCATION FUTURE IN DIGITAL AGE

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Abstract. The digitalization of education is much slower than in other areas, due to the high cost of digital solutions and their complex functionality. However, COVID-19 and the lockdown caused by it significantly changed the situation in education. The growth rate of digitalization of education during the pandemic has only accelerated and education can benefit significantly from technology through simple software solutions. All this contributes to the intensification of cooperation between universities, business, and science. The development scenarios dictated by the pandemic include a further increase in the share of online education in investment, audience reach, and the absolute number of professionals employed in it. cooperation university, business and science. Analysis of the effectiveness of education has shown that the countries of Europe and Central Asia have significant potential for the development of education.

Technologies used in education used in Tutoring, Language learning, MOOC, School Education (K-12), STEM & coding, Robotics, Information platforms, for teachers, LMS (learning management system), IT Education, Upskilling, Tools, and Talent. These technologies provide an opportunity to improve learning processes and increase its efficiency. In 2020, the EdTech startup eco-system of Ukraine has more than 80 startups that have been used for education. SWOT-analysis indicate that the EdTech startup ecosystem is characterized by more weaknesses and threats than strengths and opportunities.

Ukrainian education has significant potential for increasing efficiency and development. To ensure the realization of this potential, it is necessary to do the following: increase government spending on education, in particular on the development of innovative technologies; ensure access of EdTech to financing; accelerate the process of digitalization of education, in particular, to promote the spread of affordable ICT and introduce e-government; increase the interest of non-governmental organizations in the introduction of innovative technologies in education; create favorable conditions for the development of EdTech ecosystems.

Further development of the EdTech startup ecosystem can be a key solution for the development not only in Ukraine but also around the world.

Keywords: Digital Education, Edtech, Technological Innovation, Startup, Efficiency.

PERSONAL ENVIRONMENT SELF- DIRECTED STUDENT LEARNING. EXPERIMENT

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Abstract. The method of building a personal environment of self-directed learning (peSDL) is considered. A PLE is not a specific application or service, but a special approach to learning. The user always forms his own PLE.

The analysis of the latest researches and publications allowed to define the principles of functioning and component structure of peSDL, to recommend principles concerning formation of the digital educational environment.

The current prototype of the environment, which can be taken as a basis for building your own peSDL, is described in detail. The proposed peSDL can be used by students during distance, blended, individual and group learning. Especially relevant for those who build an individual educational trajectory.

Students are invited to a self-directed learning experiment.

The experiment is scheduled for three years till to 30.05.2023. The goal is to collect, systematize and test lifehacks that help you learn effectively. It is planned to distinguish 5 role-age categories of participants: junior schoolchildren, middle-high schoolchildren, students, adults, pensioners. The approbation will be carried out by the conveyor method. Participants select several lifehacks from the current base for individual testing. The approbation is carried out for a sufficient time to see and measure the effect of the lifehack. All participants are divided into groups according to role, age and tested lifehack. They exchange experiences in separate chats and periodic online meetings. After approbation, the lifehack in a standardized form is entered into the Personal Self-Directed Learning Environment (peSDL) database. The peSDL is available to students. The use of verified lifehacks and auxiliary information will significantly improve the quality and effectiveness of training. At the moment, the peSDL contains 594 lifehacks for testing. The base is constantly updated.

Keywords: individual educational path, distance learning, task map, tutor, self-directed learning, triad learning

USING INTELLIGENT AGENT-MANAGERS TO BUILD PERSONAL LEARNING ENVIRONMENTS IN THE E-LEARNING SYSTEM

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Abstract. In modern e-learning systems, it is important to deliver dynamic learning materials, as well as manage the training course system in a prompt manner, that is, the e-learning system should provide the user with optimal content and encourage working in groups. An intelligent agent-manager should refer students to the most relevant community or knowledge communities, examining the materials that other community members look through, and connect students and experts. The introduction of e-learning systems has also accelerated

the evolution and the learning process in higher education institutions, given the constraints of non-adaptive systems, resulting in the introduction of new open intelligent systems that are used simultaneously with web technology. This is critical to the e-learning technology being implemented across the globe. The main disadvantage of present-day learning management systems is the failure to provide students with assistance in the distance learning process, and therefore they are unable to replace the physical presence of a tutor, who generates the students' work progress. In fact, it is proposed to integrate for each student a metacognitive agent that would ensure metacognition assistance and reveal defects in the learning process and strategies. The goal is to encourage students to improve their learning outcomes measured against the learning goals and refine the learning method. The results show that there are relationships between different metacognitive attributes and student's academic excellence, that is, there is a dependence of metacognitive influence on learning outcomes, reflecting the degree of student's understanding of a particular training unit.

The article focuses on the issues of developing the structure of a multi-agent environment for e-learning systems and proposes a computer technology to ensure student activities in e-learning modular systems. The technology enables to take into consideration the factors affecting the students' learning outcomes and to form an individual trajectory of the learning session from a holistic perspective.

Keywords: e-learning; distance Learning; personal learning environment; intelligent agent-manager

THE USE OF THE CLOUD-BASED PLATFORMS AND TOOLS OF OPEN SCIENCE IN THE LEARNING PROCESS

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Abstract. The emerging ICT tools of open science are important components of university learning and research environment. The tools of open science provide the formation and maintenance of up-to-date network electronic information resources and services of open educational and research environment, as well as the use of technologies for the design and deployment of open cloud-based systems for learning and research. The main task is to create a cloud-based system of IT support for research activities of virtual research teams, to provide collaborative learning and research. As the case study the system that consists of a network ICT infrastructure, training software and related training materials and their multilingual support is considered. It is necessary to implement network instruments of open science into the learning process to prepare students for more active using of open learning and research practices. Among such instruments there are such as scientific and educational information networks; virtualized systems of educational and research support; cloud-based corporate information systems and services, which provide access of a group of users to a flexibly organized pool of electronic educational resources; distance learning support systems; information-analytical network systems for supporting research (electronic journal systems, e-libraries, web conferencing systems, etc., hosted on cloud servers or supplied as a service); project management systems; network tools for electronic learning resources design; specialized software supplied as a service (services for mathematical purposes, design, engineering,

visualization and presentation of data, statistical processing of results, semantic and syntactic analysis of texts, etc.). The methodology and methods of using these tools in the learning process are in the focus of attention.

Keywords: open science, network instruments, teachers' training, ICT infrastructure, cloud computing, learning tools.

MOODLE TOOLS FOR EDUCATIONAL ANALYTICS OF THE USE OF ELECTRONIC RESOURCES OF THE UNIVERSITY'S PORTAL

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Abstract. The need for additional analysis of the effectiveness of e-learning implementation models and their resource support in higher education institutions in the context of the COVID-19 pandemic has been actualized. An overview of solutions and case studies in the context of selecting and analyzing the effectiveness of individual services and learning management platforms is provided. It has been studied that in order to investigate the effectiveness of using electronic resources to meet students' educational needs, it is advisable to use quantitative indicators in addition to student description results. This includes data from educational analytics on the frequency and duration of students' use of individual e-resources. Reviewed the functionality modules "Course Comparison" of the Moodle LMS and "Statistics", as well as the optional Analytics module. The results of applying these modules to the analysis of e-learning courses of the National University of Life and Environmental Sciences of Ukraine and Boris Grinchenko Kyiv University are presented. The reasons for students' low use of individual e-courses were investigated. The expediency of using statistical and analytical tools in CLMS Moodle for analyzing the use of electronic courses and resources for the presentation of educational materials has been substantiated. Since the study was carried out on the basis of two higher education institutions, we can assert general trends on the problems of using e-courses in blended and distance learning. In the future, we see the need to develop a model that provides automated determination of levels of effectiveness of e-courses, e-course resources, identification of factors that affect the effectiveness of the use of courses, and specific resources.

Keywords: E-learning, Learning Management Systems, Educational Analytics, E-course, Analytics tools CLMS Moodle, Higher Education

OPPORTUNITIES AND WAYS OF USING LABORATORY EQUIPMENT IN A DISTANCE LEARNING ENVIRONMENT

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Abstract. The paper considers the issue of the possibility and methods of performing laboratory work in the conditions of distance learning, as well as the experience of using virtual work as a forced replacement of the traditional workshop. The features of the organization of distance learning in the context of the coronavirus pandemic are analyzed. The problems faced by universities in this situation are considered based on analytical data from international commissions. The problems that have arisen when using laboratory equipment to perform work in a pandemic are analyzed. The advantages and disadvantages of remote laboratory work are discussed. Problems arising when replacing real laboratory work with virtual ones are considered. An example of performing laboratory work in the conditions of distance learning, by providing remote access to them via the Internet, is considered on the example of laboratories of bioelectronics and biomechanics. The directions of further development of the virtual workshop at the Department of Computer Information Technologies are formulated.

The study of the features of laboratory work in the conditions of distance learning showed that at this point it is impossible to make full automation of equipment for remote laboratory work. Human intervention is required to carry out several operations. This makes it relevant to develop communications between students, teachers, and laboratory assistants using modern electronic means of communication, planning, and optimization of the working time of laboratory equipment. You can also use ready-made solutions for remote monitoring and control of laboratory equipment using open source software, single-board computers, cloud services, server, and client applications. The authors do not consider virtual labs as a complete replacement for real ones. However, we think that they will organically complement the classroom work after the end of the pandemic.

Keywords: e-learning, Remote Labs, Virtual Laboratory Work, CNC, 3D print

MODEL OF THE COMPETENCES IN EDUCATIONAL ROBOTICS

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Abstract. The current state of development of robotics as an applied industry shows its intensive development. As a result, there is a growing demand for robotics specialists because of an urgent need for specialists to develop, design and program robots. This contributes to the popularity of robotics as an educational trend in Ukraine and around the world.

The introduction of educational robotics as a part of STEAM education is a powerful step for development of students' soft skills, training for the implementation of real socially

significant projects, formation of practical value of theoretical knowledge, scientific world outlook and successful life in a digital society as a whole.

Taking into account the trends in the development of robotics as an applied industry and educational trend, there is a need in training pre-service teachers to make them able to teach children educational robotics. In this regard, there is the issue of determining the structure of competences in educational robotics for teachers and ways of their development. The research proves that pre-service computer science teachers are the readiest to teach educational robotics in secondary schools.

The article is devoted to the issues of developing a model of competences in educational robotics for teachers, as well as their formation in pre-service computer science teachers. The effectiveness of the model of competences in educational robotics is confirmed within the process of teaching disciplines of educational robotics for pre-service computer science teachers.

Keywords: educational robotics, STEAM education, competences in educational robotics, computer science teachers.

INTRODUCTION OF PROFESSIONAL DIGITAL COMPETENCES INTO THE EDUCATIONAL PROCESS OF JUNIOR BACHELOR OF AGRONOMY

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Abstract. The articles consider the concept of professional digital competence in the frames of the specialty 201 "Agronomy", qualification level of "Junior Specialist". There are the concepts of professional competence. The difference between the concepts of "Competence" and " Competency(professional integrity)" is shown. Integral parts of professional competence are considered. The concept of digital competence of young specialists in agronomy has been clarified. The list of modern professional digital technologies used in agriculture and the curriculumfor the specialty "Agronomy" of the "Junior Specialist" qualification level has been analysed. Close connection between existing professional digital technologies and educational programs is demonstrated. The areas of agricultural production, which have their realization in modern digital technologies are considered. A structure which is represented by three thematic areas to cover a wide range of professional digital technologies in agronomy is proposed. The presented structure can be used as a basis for introduction into the educational process of elements of modern professional digital technologies on the basis of the modern curriculum applied into educational discipline some topics, or introduction a separate educational discipline which will concentrate in itself learning of modern professional digital technologies. Analyzing the connection between professional educational disciplines and digital technologies, I came to the conclusion that professional digital technologies which are in the educational process, require changes of educational tools and require the use of modern digital devices, not limiting by PCs.

Keywords: competence, competency, agronomy, young specialist, professional digital technologies, professional digital competence, curricula.

Publisher 'payroll Serednyak TK "49000, Dnipro, 18 a / c 1212
Enlisting the subject of publishing in the State Register
publishers, manufacturers and distributors of publishing products DK № 4379
from 02.08.2012.
Publisher ID in the system ISBN 8010
49000, Dnipro, 18 a / c 1212
Tel. (096) -308-00-38 (056) -798-04-00
E-mail: 7980400@gmail.com
www.isbn.com.ua