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THE USE OF DIGITAL TECHNOLOGIES WHILE PROVIDING BLENDED LEARNING AT PEDAGOGICAL INSTITUTIONS OF HIGHER EDUCATION

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The article deals with the analysis of thematic variability and functional range of digital technologies used in the process of blended learning organization. This issue is essential because of the challenges of Coronavirus pandemic and the full-scale invasion of the aggressor country. At the first research stage the contents of the term “blended learning” was analyzed. At the second stage a survey was conducted using Google Forms and at the final stage the review of digital resources for the organization of blended learning in pedagogical institutions of higher education was carried out.

Keywords: digital technologies; blended learning; educational process; higher educational institution; electronic resource; software; application; digitization of education.

ЗАСТОСУВАННЯ ЦИФРОВИХ ТЕХНОЛОГІЙ В ПРОЦЕСІ ОРГАНІЗАЦІЇ ЗМІШАНОГО НАВЧАННЯ У ПЕДАГОГІЧНИХ ЗАКЛАДАХ ВИЩОЇ ОСВІТИ

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У статті проаналізовано тематичну варіативність та функціональний діапазон цифрових технологій, які використовуються у педагогічних закладах вищої освіти в процесі організації змішаного навчання. Автором означено, що незважаючи на значну кількість вітчизняних дослідницьких спроб окреслити підходи до вивчення дидактичного потенціалу та тематичного різноманіття цифрових технологій, актуалізується нова потреба в аналізі означеної проблеми для виконання стратегічних освітніх завдань, серед яких чільне місце відводиться розробці дієвої системи змішаного навчання. Цей фактор зумовлює актуальність зазначеної проблеми в контексті викликів пандемії коронавірусу SARS-CoV-2 та повномасштабного вторгнення країни-агресора, які постали перед вітчизняною системою освіти на сучасному етапі її розвитку. На першому етапі дослідження було проаналізовано змістове наповнення терміну «змішане навчання», під яким слід розуміти навчальну діяльність, у ході якої пізнавальна складова навчання здобувачів вищої освіти реалізується не лише на занятті в процесі академічної взаємодії із викладачем та іншими учасниками освітнього процесу, але й під час самостійної роботи з електронними освітніми ресурсами. На другому етапі було проведено

анонімне опитування із використанням програмного забезпечення Google Форми для того, щоб визначити рівні інтенсивності використання цифрових технологій у процесі змішаного навчання. На третьому етапі дослідницького пошуку було здійснено огляд цифрових ресурсів для організації змішаного навчання в педагогічних закладах вищої освіти. Автором було охарактеризовано як універсальні технології та ресурси для підготовки вчителів, так і специфічні для фахового становлення майбутніх учителів іноземних мов, а також математичного, економіко-географічного, фізичної культури та мистецького спрямувань.

Ключові слова: цифрові технології; змішане навчання; освітній процес; заклад вищої освіти; електронний ресурс; програмне забезпечення; застосунок; цифровізація освіти.

At present, on the way of integration in the world and European community, the native system of education faces the challenges of Coronavirus pandemic SARS-CoV-2 and the full-scale invasion of the aggressor country. These urgent troubles require deep paradigmatic transformations while providing gradual changes in effective system of blended learning under the conditions of an uncertain future. Proceeding from the above facts, traditional approaches in forming general and subject matter (of specific profession) competences of a would-be teacher are to be reconsidered via the necessity to promote active application of digital technologies while professional training of a competitive and equipped teacher of the New Ukrainian School at pedagogical institutions of higher education. Thus, thematic diversity of digital technologies, their vast functional potential to solve new strategical educational tasks have appeared to be a subject of our research within this study.

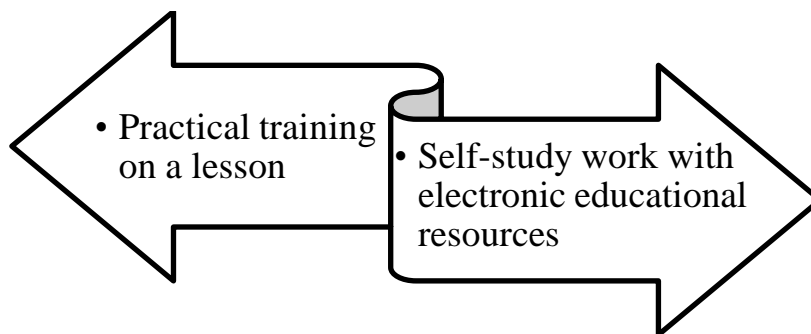
The strategical line for digitalization in education is determined in legislative and program papers: Laws of Ukraine “On Education”, “On Higher Education”, “The Concept of Development of Pedagogical Education”, “The Strategies of Development of Higher Education in Ukraine for 2021–2031”. “The Conception of digital agenda of Ukraine – 2020” states, applying digital technologies in the educational process of educational institutions is to be of a through character [7]. Therefore, their use should be determined by systemic and didactic expediency.

A complex analysis of the issues of digital technologies implementation in the educational process of institutions of higher education is reflected in the search of scientists: V. Domnich, M. Drachuk, Z. Fedorovych, I. Kharchenko, O. Savchenko, I. Shyshenko, H. Skaskiv and others. Here the theory and practice of blended learning implementation is described by L. Antoniuk, O. Bondar, I. Khomiuk, H. Mykhailiuk, O. Pasichnyk, H. Tkachuk, O. Vasiuta and others. The foreign experience to use digital resources and technologies by pedagogical staff in their profession is studied and analyzed by D. Antoniuk, Y. Boiko, O. Kravchyna, T. Vakaliuk and others. In spite of many native experiments to analyze the approaches to study didactic potential and thematic diversity of digital technologies, a new demand in the study of the issue is getting urgent in order to perform strategical educational tasks. Here the development of an effective system of blended learning has appeared to be prominent. This factor causes the topicality of the stated issue within the challenges the native system of education face today.

The aim of the article is to analyze and characterize the thematic and functional orientation of digital technologies while providing blended learning at pedagogical institutions of higher education of Ukraine.

At the first stage of the study we analyze the content of a key notion of the study – blended learning. Here we provide the following definition: studying (or according to it), a

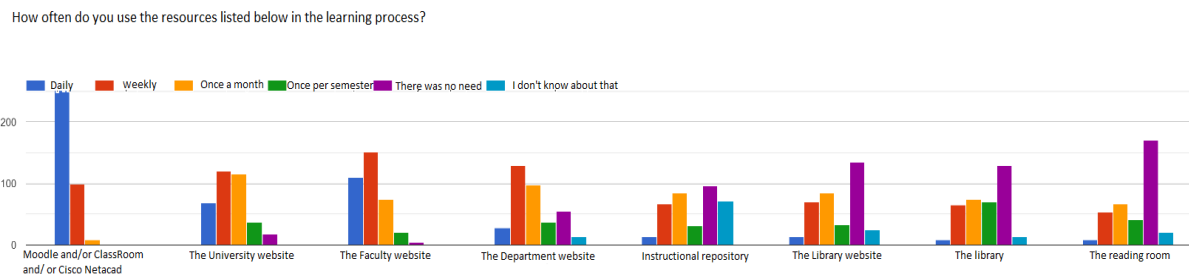
part of cognitive activity of higher education applicants is implemented while direct practical training and academic cooperating with a teacher and other educational process participants at lessons, and the other part (it is to be seen on Pic. 1) – during self-study with electronic educational resources used for modernizing the learning process and providing access to qualitative technical and learning support for higher education applicants. The provision is developed with ICT.



Pic. 1. Context of the term “blended learning”

Proceeding from the information above, qualitative and effective functioning of the institutions of higher education is impossible implementing no digital learning instruments, including the distant learning platforms – Moodle, Google Classroom, Cisco Netacad, Equity Maps and others. Applying them promotes consolidation of all participants of educational process into an integrated system in order to model a personalized educational community. The platforms are used as both tools for technical organization of distant learning and support of direct face-to-face approach. They represent a wide range of educational elements which make a full value dialogue between a teacher and higher education applicants possible, and are used to inform, learn and evaluate academic improvement of students’ youth.

At the second study stage we present the data of the anonymous survey using the software Google Forms in order to determine the frequency level of digital resources implementation in blended learning. We involve 362 respondents, who represent 11 faculties and 1 Educational and Scientific Institute of Economics and Business Education of Pavlo Tychyna Uman State Pedagogical University. The participants answer 3 questions. Here we analyze the answers.

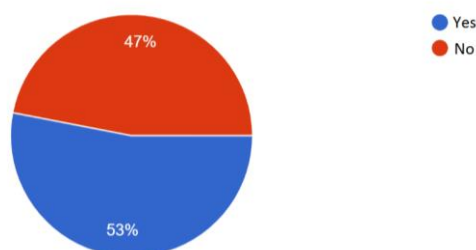


*Pic. 2. The answer results to the question № 1
“How often do you use the resources listed below in the learning process?”*

Picture 2 proves that according to visual quantitative indexes, more than 200 higher education applicants use Moodle and/or Classroom and/or Cisco Netacad every day. The choice is not accidental, because Moodle is a basic educational platform to organize distant and blended learning in the institution. On the informational course pages participants may find the information on the lectures, glossary, working program and syllabus of the educational component. Moreover, the list of practical tasks including detailed instructions for self-study is presented as well. It greatly makes applicant preparation for classes easier. Every week 150 students use the faculty site which includes the detailed information on educational process organization and electronic schedule. Within the parameters, more than 100 higher education applicants use the sites of the faculty and its departments. Once a month more than 100 educational process participants use the university site. Considering the institutional repository application, the level of its use is insufficient because the platform represents a powerful information resource of scientific and pedagogical staff of Pavlo Tychnya Uman State Pedagogical University. At the same time the professors are the subject developers and researchers within the issue of their courses. Considering the use of the library and reading room resources, we state that the applying level is insufficient as well because of the rapid spread of electronic educational publications as a time demand.

Picture 3 identifies that the next question is on the use of the mobile apps Moodle and/or Classroom of PlayMarket and/or AppStore in order to have the access to the material. More than 50% respondents answer in the affirmative. Again, it proves the idea that the platforms Moodle and Classroom are spread in the institution and easy to use.

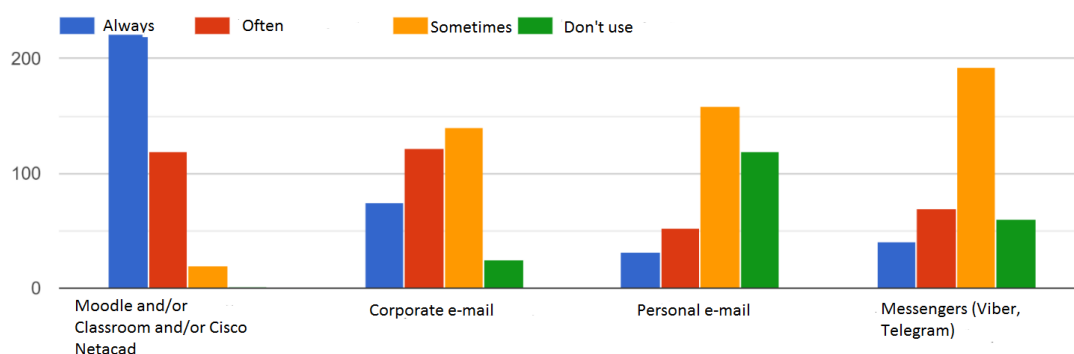
Do you use mobile apps Moodle and/or Classroom from PlayMarket and/or AppStore to access content on the relevant platforms?
362 answers



Pic. 3. The answer results to the question №2 “Do you use mobile apps Moodle and/or Classroom from PlayMarket and/or AppStore to access content on the relevant platforms?”

The answer results to the question № 3 support the idea that the distant learning platforms are inseparable attributes of the cooperation between the educational process participants during blended learning. Considering the answer “Always”, we conclude, most higher education applicants (more than 200) apply Moodle and/or Classroom and/or Cisco Netacad (picture 4). More often corporate email and sometimes messengers are operated to implement the listed academic tasks. The frequency of the answer “Personal email” is quite natural because every higher education applicant uses the corporate account and the personalized email for academic communication.

How do you receive assignments and send completed work for review?



*Pic. 4. The answer results to the question № 3
“How do you receive assignments and send completed work for review?”*

Considering the distinctive predominant platforms and the analysis of survey results, at the third stage of the study the review of other platforms for blended learning organization at pedagogical educational institutions seems to be expedient.

We note the platforms Zoom, Google Meet, Webex, Skype, Google Hangout and others suggest that classes may be conducted in a synchronic regime. Besides, they provide the necessary information for educational process participants and raise the quality of educational services greatly.

Cloud technologies are implemented to support educational process with qualitative and effective learning instruments which are easy to access both at lessons and home. The access is provided with the browser. Thus, the need to install programs, save files disappears. These technologies are meant for synchronization and saving files, marks or software. Educational process actively applies the following Google services: Google Apps, Google Mail, Google Drive, Google Slides, Google Forms, Google Sheets, Google Docs, Google Calendar, etc., which allow to work with documents, texts, tables, presentations, plan the affairs, work on information, etc.

It is urgent to mention one of the most world visited site – YouTube, which is mostly used to search for and watch videos, share uploads, because its use is free. Educational opportunities of YouTube are vast; one may find immense educational channels, educational videos, video blogs, video instructions, etc.

Here we to describe the main features of digital resources which are applied for educational purposes. Blogger – a free resource from Google. It doesn't require an additional registration if one has an account. The main content is of records, multimedia and images that are systematically uploaded. The resource is easy to use, has an integrated constructor. Thus, a user may have no software or programming knowledge.

Trello is a free visual instrument which provides project managing, working processes optimizing, completed assignments monitoring, etc. Using it, you may work with cards that are joined into virtual boards. A new board is made for every new project; later it is filled with cards which illustrate specific actions, resources to realize, terms and doers.

Padlet is another virtual board used to diversify presentations and home assignments. Thanks to many masks, Padlet is an indispensable resource to create a portfolio or review, a

calendar, complete creative tasks, etc. It is possible to work with it both individually and in a team.

Pinterest is a public photo-service. The platform deals with connecting people in accordance with their favors and needs. It is a searching service that may be used to develop and implement creative projects.

Tagxedo is an online service to organize a cloud of words (tags). It is easy and suitable to use, because the service helps develop tags of different forms and sizes. Here we may apply the recommended library if text downloading or link to the page with the necessary text, is presented. It is free and requires no registration.

In order to design animated presentations and for explaining complicated material with limited time, the software Powtoon may be used. By its structure, the resource is close to the popular Power Point, but every slide of this service is an animated part of a presentation that may last for several seconds and contains sound.

Adobe Spark represents a tool to create visual content, especially images for social networks, web-pages, graphics and video stories. Considering from the above information, its purpose is of developing registers, greeting cards, invitation cards, welcoming cards, announcements, portfolio, travelling journals, etc.

Service Loom promotes designing video with audio accompaniment. A user may spread video with the link.

Specialized programming instruments are an important means to organize educational process in blended learning. These programs are indicated depending on their trends and specific use. Here we describe the most popular. In order to learn a foreign language, higher education applicants may use the following services: for beginners – Duolingo, Memrise; with different knowledge levels – EngVid, BBC Learning English, Cousera, etc. In order to improve the current foreign language proficiency level, the following tools may be applied: EnglishDom, TED, Loyal books, Prometheus, Tandem and others. Most of the resources are available in mobile apps; they are aimed at the users' choosing the appropriate form of work for them, including lectures listening, online simulators implementing, apps to learn new words communicating with others in messengers.

Programming tools of mathematical purpose are greatly popular today. Maple, Matlab and Maxima, etc. are characterized by a powerful instrument and a wide range of tasks to complete. Methodology of informatics and mathematics widely use GeoGebra, MathKit, GRAN and others, as they present an easy and available interface and instruments [5].

Mapping material is often used at lectures and seminars of economic and geographical courses. Thus, Google Maps, Street View, EarthCam, Google Forms, Google Docs, etc. are widely spread. With interactive maps higher education applicants may use data bases of population and economy of the world countries in order to implement an educational purpose here. While studying distant investigative methods, the platform NASA Giovanni is applied. It is an interface that provides analyzing the NASA data from the satellite and the Earth surface. This statistic and mapping information helps higher education applicants form a complete picture of the present status of the world countries and analyze the processes inside them. It promotes teacher's work with diversifying assignments. The service excludes the display of academic dishonesty [3].

Intensive development of digital technologies greatly influenced the choice of teaching technologies of the art courses. Mobile app which is widely used in this sphere we may suggest, is Google Lenz. The app helps find the information on artists, portraits, photos and

the names of works by the image. It also provides completing interactive assignments with the use of camera or photos, texts translation as well. The app Google Arts & Culture promotes learning the words of art and culture, creative works of famous artists, art works, etc., as this resource contains the information on more than 2000 art institutions all over the world. While organizing educational process on art courses, teachers may use presentations, electronic tables or printed sheets, etc. [2].

Considering implementation of digital technologies in would-be physical education teachers training, we state the following programming apps which are used for: diagnosing the level of everyday activity, energy expenses, breathing (Samsung Health, Google Fit, Nike Plus Running, Health, HealthKit, MyFitnessPal, etc.); diagnosing person's physical state (Breathe, Digifit iCardio, BackExercises, Google Fit and others); determining body weight, calorie value of dishes, balanced diet (Dialife, Lifesum, Fatsecret, Myfitnesspal, Yazio Calorie Counter, etc.), water balance (Water Drink Reminder, Water Your Body and others). In general, they improve the quality of would-be physical education teachers training [1].

Thus, the educational process in blended learning is an equal alternative of direct face to face education, especially under the present difficult conditions: at times of martial law and Coronavirus pandemic, including a list of disadvantages. Applying digital technologies is not to substitute a teacher, but gives opportunity to make the process interesting, easy to access and effective. While digitalizing, the problems of improving teaching methodologies of specific courses and the level of effective applying innovative digital technologies in educational process of institutions of higher education are still actual. Prospects for further research will touch the analysis of the role of digital technologies while training would-be teachers of the New Ukrainian School under difficult current conditions.

СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ

1. Грабик Н. М., Грубар І. Я. Цифрові технології в підготовці вчителів фізичної культури. *Сучасні цифрові технології та інноваційні методики навчання: досвід, тенденції, перспективи*: матеріали ІХ Міжнар. наук.-практ. інтернет-конф. (Тернопіль, 28 квітня 2022 р.). Тернопіль: ТНПУ ім. В. Гнатюка, 2022. С. 87–90.
2. Кондратова Л. Цифрові технології у викладанні мистецтва. *Регіональні культурні, мистецькі та освітні практики*: матеріали ІХ Міжнар. наук.-практ. Інтернет-конф. (Переяслав, 27–28 квітня 2022 р.). 2022. С. 60–62. URL: https://scholar.google.com.ua/citations?view_op=view_citation&hl=uk&user=65LKeaMAAAAJ&cstart=20&pagesize=80&citation_for_view=65LKeaMAAAAJ:cFHS6HbyZ2cC (дата звернення: 15.04.2023).
3. Муромцева Ю. І. Використання цифрових технологій у навчанні економічної географії. *Цифрова трансформація та диджитал технології для сталого розвитку всіх галузей сучасної освіти, науки і практики*: матеріали Міжнар. наук.-практ. конф. (Ломжа – Харків, 26 січня 2023 р.). Ломжа: MANS w Łomży, 2023. С. 330–332.
4. Про освіту: Закон України від 05.09.2017 № 2145–VIII. URL: <https://zakon.rada.gov.ua/laws/show/2145-19> (дата звернення: 15.04.2023).
5. Прошкін В., Хоружа Л., Семеніхіна О. *Теорія і практика професійної підготовки майбутніх учителів математики та інформатики засобами цифрових технологій*: монографія / за ред. О. Литвин. Київ: НМЦ видавничої діяльності Київського університету імені Бориса Грінченка, 2021. 332 с.
6. Харченко І., Шищенко І. Результати упровадження цифрових технологій у професійну підготовку майбутніх фахівців в умовах ЗВО. *Професіоналізм педагога: теоретичні й методичні аспекти*. Слов'янськ, 2021. Вип. 16. С. 26–35.
7. Цифрова адженда України – 2020 («Цифровий порядок денний – 2020»). Концептуальні засади. Першочергові сфери, ініціативи, проекти «цифровізації» України до 2020 р. URL: <https://uccs.org.ua/uploads/files/58e78ee3c3922.pdf> (дата звернення: 15.04.2023).

REFERENCES

1. Hrabuk, N. M., Hrubar, I. Ya. (2022). Tsyfrovi tekhnolohii v pidhotovtsi vchyteliv fizychnoi kultury. *Suchasni tsyfrovi tekhnolohii ta innovatsiini metodyky navchannia: dosvid, tendentsii, perspektyvy*: proceedings of the IX International Scientific and Practical Internet Conference. Ternopil: TNPU im. V. Hnatiuka, 87–90 [in Ukrainian].
2. Kondratova, L. (2022). Tsyfrovi tekhnolohii u vykladanni mystetstva. *Rehionalni kulturni, mystetski ta osvichni praktyky*: proceedings of the IX International Scientific and Practical Conference, 60–62. URL: https://scholar.google.com.ua/citations?view_op=view_citation&hl=uk&user=65LKeaMAAAAJ&cstart=20&pagesize=80&citation_for_view=65LKeaMAAAAJ:cFHS6HbyZ2cC [in Ukrainian].
3. Muromtseva, Yu. I. (2023). Vykorystannia tsyfrovyykh tekhnolohii u navchanni ekonomichnoi heohrafii. *Tsyfrova transformatsiia ta dydzhytal tekhnolohii dlia staloho rozvytku vsikh haluzei suchasnoi osvity, nauky i praktyky*: proceedings of the International Scientific and Practical Conference. Lomzha – Kharkiv: MANS w Łomży, 330–332 [in Ukrainian].
4. Pro osvitu: Zakon Ukrainy vid 05.09.2017. № 2145–VIII. [On Education: Law of Ukraine from September 5, 2017. № 2145–VIII.] URL: <https://zakon.rada.gov.ua/laws/show/2145-19> [in Ukrainian].
5. Proshkin, V., Khoruzha, L., Semenikhina, O. (2021). Teoriia i praktyka profesiinoi pidhotovky maibutnikh uchyteliv matematyky ta informatyky zasobamy tsyfrovyykh tekhnolohii. O. Lytvyn. (Ed.). Kyiv: NMTs vydavnychoi diialnosti Kyivskoho universytetu imeni Borysa Hrinchenka [in Ukrainian].
6. Kharchenko, I., Shyshenko, I. (2021). Rezultaty uprovezhennia tsyfrovyykh tekhnolohii u profesiinu pidhotovku maibutnikh fakhivtsiv v umovakh ZVO [The results of the implementation of digital technologies in the professional training of future specialists in the conditions of higher education]. *Profesionalizm pedahoha: teoretychni y metodychni aspekty – Teacher professionalism: theoretical and methodical aspects, issue 16*, 26–35 [in Ukrainian].
7. Tsyfrova adzhenda Ukrainy – 2020 (Tsyfrovyy poriadok dennyy – 2020). Kontseptual'ni zasady (versiya 1.0). Pershocherhovi sfery, initsiatyvy, proekty – tsyfrovizatsiyyi Ukrainy do 2020 roku. [The Digital Advent of Ukraine 2020 (“Digital Agenda”–2020). Conceptual basis (version 1.0). Priority areas, initiatives, projects of “digitalization” of Ukraine by 2020]. URL: <https://ucci.org.ua/uploads/files/58e78ee3c3922.pdf> [in Ukrainian].