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Organisation of the Educational Process Through the Technology of Blended Learning

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Abstract

The article has determined that the introduction of mixed learning is not only the transfer of many elements of the educational process into the electronic environment but also the design of a professionally-oriented educational environment of universities and the instructional design of electronic courses. The hybrid electronic course of the discipline “Digital technologies in education and research” by the principle of the backward design was developed and tested. The given examples of students’ creative work were submitted in the form of projects, websites, blogs, web quests, and online conferences. Presents the main tips that need to be followed for effective development and implementation of blended learning.

Keywords: *blended learning, education, instructional design, electronic course*

Introduction

Each year, the use of digital technologies in education is expanding significantly. Personalisation of education includes adapting educational content, the possibility of accommodation of the online resource both to the specifics of educational

programmes, the teacher's personality, and the age, psychophysical, and other students' characteristics, which will provide accessibility and cross-platform. Most of the initiatives in this area are implemented in the SaaS format, which allows for creating virtual personalised learning environments. Separately, it needs to be highlighted the motion in the direction of BYOD (Bring Your Own Device) in traditional educational institutions, which allows you to reduce the cost of purchasing computers, smartphones, tablets, and other gadgets. Education is becoming available almost everywhere, where the Internet is, and from any device (smartphone, tablet, and computer).

That, in turn, raises the question of the motivation of self-education of the users for the scientific community because, through mass open online courses, knowledge has become more accessible, but the value of the content itself has dropped significantly. If the monopoly of knowledge was previously in educational institutions, then the course is now being decentralised. Everyone can be a source of educational content. Therefore, it is necessary to develop systems for additional attraction of students and any decisions that increase interest in the educational process and allow gathering of the whole community – teachers, students, administration, and parents.

The next aspect is a balanced integration of virtual and complementary reality with online educational services to enhance motivation. Even before the pandemic, the focus of global companies in the field of virtual and complementary reality has started to move towards education, providing comprehensive 3D solutions through the creation of content to equip educational institutions with the necessary equipment that becomes an integral part of learning and an educational tool for personalisation of the process. “The education industry saw another groundbreaking year when it comes to venture capital funding, reaching three times pre-pandemic investment levels in 2021, according to a new report” (Fittes, 2021).

A new trend is the processing of large data sets and adaptive learning, predigital technologies analytics and digital evaluation (the digital education quality assessment system). The global transition to a knowledge economy and the struggle for talent changes the approach to human capital development. The rigorous selection of talent changes to the need to identify them, develop them, and invest time and money. The main trend of the global education system is the review of uniform qualification exams and diagnostic systems and the development of new diagnostic and detection technologies. With the help of such technologies, teachers can quickly analyse how the student learns material from each subject, predigital technologies assessing the process and making the necessary changes to

the learning process based on the analysis of statistical data, assessing the quality of learning and creating new tasks based on student progress.

Therefore, higher pedagogical education today no longer poses the question – whether to apply digital technologies because the current state of their development and the realities of the XXI century require qualitatively new approaches to the training of future specialists, especially future educators.

Research Problem

The importance, efficiency, and promising use of electronic materials in the educational process to optimise the students' independent work, control academic achievements, and establish feedback with students are well understood in the higher school during the last 10–15 years. Universities build their own integrated electronic information and education systems, deploy distance learning systems, and develop and implement smart universities. World practice quite successfully produces and tests new pedagogical approaches that substantiate the new methodology of constructing an educational process based on electronic technologies. At the same time, eLearning, in most cases, is understood in the Ukrainian education system rather narrowly – as an auxiliary toolkit for a traditional educational process. Mostly, in the universities of Ukraine, mixed forms of use of e-learning in the educational process are used.

Research Focus

The introduction of blended learning in the educational process of pedagogical universities in connection with the reduction of synchronous classroom learning in quarantine and martial law in Ukraine is load is a very important process as it involves reducing the number of classroom activities by transferring part of the activities to the electronic environment. The relations between classroom (synchronous) and the electronic (asynchronous) components may vary and depend on many factors: the subject area, the age of the students, the level of students' preparedness, and the technical infrastructure for conducting the training.

It should be noted that the introduction of blended learning is not only the transfer of many educational process elements into the electronic environment and, as a consequence, the reduction of student interaction with the teacher. The main attention should be paid to the design of a professionally-oriented educational environment for pedagogical universities and the instructional design of electronic courses, methods of development and implementation, which is the article's purpose.

Results

There are many models of blended learning, simple, complex, more and less popular, etc. Most blended learning programmes resemble one of four models: Rotation, Flex, A La Carte and Enriched Virtual (Horn & Staker, 2014).

During the experimental work, it was determined that the Rotation model (Station Rotation, Lab Rotation, Flipped Classroom, Individual Rotation) is most frequently used in higher educational institutions of Ukraine when the methods of work with the material (one of them is online education) may vary during the study programme or the study of a separate discipline. Other ways to work with the learning material in the rotational model are classroom study in small groups, full-time work of the whole group on solving a specific problem, group projects, individual classes, creative tasks, collaborative learning, portfolio, case-method, cognitive instructing: comparison, comparison and contrast (analysis) of the revealed properties, etc.

Study of the foreign experience of the introduction of blended learning (Vitošević et al., 2014; Stannard, 2015; Hrastinski, 2019; Singh et al., 2021) and their own pedagogical experience have allowed us to conclude that the most often used pedagogical approach is the rotating model “Flipped classroom”. Its direct instruction is shifted from a group learning space to an individual learning space, and the resulting group space turns into a dynamic, interactive learning environment in which the teacher manages the educational process using interactive technologies. The main point of “inverted” technology is to rearrange key components of the educational process through the active use of the LMS. In the synchronous mode in the audience or online, work is underway to clarify the understanding, give answers to the questions made by students, and, most importantly, the analysis of decisions already made by students and the formulation of new ones. Then in the asynchronous mode, it is working out of the solutions created on lessons, consolidating the material and automating control over the learning outcomes on the topic.

The theoretical material or instructions can be removed from classroom work, for example, through short video clips or online tutorials (for example: <https://view.genial.ly/61b1eecb1648f0dd218dcef/interactive-image-proekt>). It measures free more personal time for interaction between students at the level of pairs or small groups. Students can view the important content as many times as necessary to understand the subject and come to classrooms prepared for practical tasks, ready to answer questions, work on collaborative projects, and study the content. This model works best if the teacher wants to develop his students’ skills and not just give the content of the material.

It should also be noted that online and traditional education are not interchangeable. Both have different parameters that need to be considered when deciding what training aid to use or how to combine it. Therefore, the next very important aspect of the introduction of blended learning is the development and implementation of electronic training courses (the so-called hybrid courses) that promote the individualisation of the educational process (allow the individual learning style of students: the level, type of cognitive abilities, the rate of remembering of the material), focused on the results of discipline learning, ensure the involvement of students in educational activities, increase their success.

The hybrid course (a definition we use as interconnected with the definition of “blended learning”) is a model of course design that combines traditional, classroom, online and non-auditing work. Courses can be mixed in many ways and for many reasons; in general, hybrid courses are defined as those in which from 20% to 30% of traditional classroom teaching is replaced by online non-auditing work (Anthony et al., 2022). It differentiates the “hybrid courses” from the “web-extended courses” (additionally to the traditional educational system, students continue to work in the classroom in the synchronous mode (face-to-face) and fulfil the planned amount of study load. Less than 20% of the educational activity is in the network in the asynchronous mode) and “online courses” (education is fully implemented and exclusively remoted through the online course management system, communication and interaction between teachers and students takes place based on forum, assignments, live chat, social networking, webinars, blog, workshops, and surveys – more than 50% of educational activities are conducted in the network in the asynchronous mode).

To test the blended learning model, we have developed a hybrid electronic course discipline, “Digital technologies in education and research”. One of the main principles of hybrid electronic course development is the principle of backward design. The development of the course did not begin with the search for content and the development of the content part for the relevant field of study, but for the preparation of curriculum and studying programmes of discipline, with the determination of the planned learning outcomes and the choice of appropriate methods for their evaluation. Subsequently, the selection and structuring of educational materials were conducted. In the last step, the strategy of teaching (taking into account the type of discipline and speciality) was determined, and the types of educational activities and scenarios of the participant’s interaction in the educational process to maximise the involvement of students in online and classroom interaction.

In relation to the training of future teachers for innovative teaching activities, the methodology for the development and implementation of a blended course

should be based on the following principles: the focus on the formation of innovative competence and components of readiness for innovative pedagogical activities; creation of conditions for the reflection of the performed educational, quasi-professional and educational-professional activity and its results; accounting for the success of each student; the focus on ensuring the autonomy of planning and organisation of teaching and research and professional activities; facilitation of the process of preparation for innovative pedagogical activities; ensuring the integration of readiness components for professional mobility.

However, it should be noted that along with the undeniable advantages of the development and application of electronic courses at the stage of the study, certain drawbacks were identified: the complexity of the methodological support; feedback issues, which are an important part of the organisation of blended learning; low readiness of teachers to develop and implement electronic training courses.

In connection with this, when choosing the technology for implementing hybrid courses, we consider it necessary to use the principle of additionality, integrating blended learning with mesotechnologies – design, interactive, game technology, problem, modular, viticent training, etc.).

Let us consider it on the example of designing the teaching methodology of the discipline “Digital technologies in education and research” (URL: https://iito123.blogspot.com/p/blog-page_17.html). Schematic teaching methodology discipline with blended learning can be represented as follows.

Forms of training: lectures, laboratory work, independent work, group work, individual consultations, research work, conferences.

Teaching methods: visual, problem, practical, project, research, interactive, problem-solving, stimulation and motivation of educational-cognitive activity, control and self-control in studying, inductive-deductive, partial-search.

Pedagogical technologies: problem, interactive lectures, lecture with planned mistakes, work in small groups according to the rotation model “Flipped classroom”, discussion, work in small groups using the “Debates” technology, “Industrial Failure”, “Joint Project”, “Information Search”, “Carousel”, Teachback, synectic brainstorming, design thinking, individual and group work, individual practical work, laboratory rotational model, cooperative learning technology (more detailed: <https://docs.google.com/document/d/18RgjN8YJfSBzO3Jr5PqdJBKzaEGW-W89OdKJdspPnNDI/edit?usp=sharing>).

Additionally used: feedback from the teacher based on the results of online student work, introductory conversations and mini-lectures; online work with educational materials: work with electronic course discipline, electronic textbooks, video content; reading, selection of additional literature, tasks for

self-reflection and self-control; independent work (preparation of Web services, preparation of presentations and publications, posts in the blog, mutual evaluation and review, work on the project blog); independent work – the refinement of creative and practical tasks; current control: self-test (tests), testing on the results of module study, participation in online work, the evaluation of creative project.

This method of work promotes not only the teaching of different digital technologies and their adaptation to the requirements of the educational process but also the involvement of future teachers in active collaboration on the development of educational content through the combination of knowledge of different disciplines. Students should be able to choose resources, be motivated to study independently, understand the process and methods of developing and applying electronic educational resources for teaching, studying, social, etc. educational activities, know the role of a teacher in a projected educational environment, methods and means of development and expand of their own information space. For example, are given the examples of creative work of students that are presented in the form of a:

- projects (<https://view.genial.ly/623afad74805bc00102f20cf/presentation-poetapne-stvorenniya-proyekta>);
- web sites (<https://sites.google.com/view/learn-english-with-oya/about-serial>; <https://sites.google.com/vspu.edu.ua/improveyouenglish/about-us>; <https://sites.google.com/vspu.edu.ua/intelligent-cat/modal-verbs?authuser=1>);
- blogs (<https://goldicup.blogspot.com/>; https://ztarukyana.blogspot.com/p/blog-page_45.html);
- web quests (<https://www.thinglink.com/scene/1116692439780818946>; <https://www.thinglink.com/scene/900429232289611776>; <https://view.genial.ly/5fb46e0082c7e10d0789cb33/interactive-image-etap-1>; <https://padlet.com/yanazsaruk/nysb9qo2hj0jppqo0>);
- web conferences (<https://youtu.be/KSyyJfEpBxU>, https://m.facebook.com/story.php?story_fbid=3183358648552802&id=100006360944297).

Teachers had the opportunity to change students' attitudes toward the learning activities and the working regime through working with the usage of interactive methods. At the same time, students were put in a position in which they were not only objects of pedagogical influence but also subjects of interdependent educational activity with other students and teachers.

This methodological system of work allows us to prepare future teachers for the formation of Web 4.0 (Huk, 2021), whose principles are based on the theory

of Bruner constructivism – cognitive psychology, the content of which is to create their own knowledge based on previously acquired information.

Conclusions

The distinctive feature of the modern education system is the transition from a “knowledge paradigm” of training in the form of ready-made knowledge to a value-semantic and personally-developing paradigm – the development of personality, individual abilities, cognitive activity, and thinking autonomy. If earlier the main activity of students was “consumption of knowledge”, derived from the books and received from the teacher, now the focus shifts to „knowledge management”: search, edition and development of content”.

According to this, future teachers need to be able to adapt learning theories (from behaviourism to social constructivism) in practice to promote the development of students’ skills in several dimensions (thinking, practice, tools, and responsibility). They also must know how innovation can be introduced into future pedagogical activities through acquiring the necessary knowledge, skills, views, and values that should be related to competencies. The latter’s development is important for determining the feasibility of mixed learning usage as a pedagogical technology and checking off teachers’ pedagogical aims through Bloom’s expanded digital taxonomy (knowledge, understanding, application, analysis, synthesis, and evaluation). The continuum of application of innovative pedagogical technologies provides stability to innovative practice, which, after developing a stable background for future teachers, allows a teacher-practitioner to transfer such competencies to general education.

The introduction of the methodology allowed us to outline seven basic tips that, as we believe, should be followed for the effective development and implementation of blended learning technologies.

1. Give priority to the needs and wishes of students. For effective online education, students must be convinced that their efforts and time spent studying will contribute to their further professional development. They must know the answer to the question, „How can this help me work more effectively and efficiently?” Take into account and use the acquired knowledge and experience of students. Also, it must be remembered that all modern students want education to be personalised, independent, entertaining and social.
2. Take into account the preparedness of teachers who will work on the online course, their knowledge, skills and working methods.

3. Thoroughly plan long-term learning results, as well as short-term learning goals and learning content that directly passes to specific needs. Create content that allows students to practice the behaviour they need. Designing a learning process and meeting a clear plan is the key to effective learning development. Time is always a problem, but this should not be a reason to miss the necessary steps to create effective learning solutions.
4. Simplify content and encourage students to study. Students should process a large number of heterogeneous and diverse information during the study, and now everyone faces the problem of overestimation. Therefore, it is necessary to choose the material carefully, structure it correctly and logically, and encourage students to study (for example, using storytelling and gamification).
5. Plan to use different devices. Future teachers must understand that one can learn at any time, with any device and anywhere. Therefore, using several delivery methods and channels of educational decisions contributes to their readiness for use in future professional activities.
6. Use interactive learning methods and technologies, including aimed and structured group work, guided learning and individual activities.
7. Focus on developing higher-order thinking and meta-cognition, and use dialogue and polls properly.

In conclusion, we would like to emphasise that the rapid spread of digital technologies opens up teachers, psychologists, physiologists, sociologists, and other specialists to the unique opportunity to study cognitive processes, to model the presentation of knowledge, individual and collective cognitive activity, interaction of people with the world system of information, knowledge and culture. It will allow qualitative improvement of the educational system, in which modern technologies will stay in balance and reasonably combine with the traditional achievements of pedagogy. It will provide teachers and students with new opportunities and benefits: from the passive perception of knowledge to independent creative activity, from traditional education to joint discussions and research, from dry points to fully-planned integrated assessment of personal qualities, from limited counselling to large-scale educational services, and, finally, from one diploma to several diplomas and certificates, that will develop a complex professional portrait of a prepared specialist.

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