

# FEATURES OF DESIGNING DISTANCE COURSE FOR BLENDED LEARNING

## ОСОБЕННОСТИ ПРОЕКТИРОВАНИЯ ДИСТАНЦИОННЫХ КУРСОВ ДЛЯ СМЕШАННОГО ОБУЧЕНИЯ

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**Abstract:** *The transience and volatility of the modern world are main drivers of the constant changes in the requirements for training of the future specialists. The process of introducing new information technologies into the educational process doesn't stop and requires modern solutions in methodological training systems. In particular, an integral component of the modern education is the introduction of distance learning courses both in the course of full-time and distance education. As for organization of the distance learning, the distance course becomes not only a source of knowledge, but also serves as a means of communication with the teacher and classmates at a distance. In full-time education, the distance course serves to support the learning process, because of being an effective means of organizing independent work and access to educational materials.*

**KEYWORDS:** *blended learning, distance course, distance education, web applications, web programming.*

### 1. Introduction.

The transience and volatility of the modern world are main drivers of the constant changes in the requirements for training of the future specialists. The process of introducing new information technologies into the educational process doesn't stop and requires modern solutions and development of the in methodological systems of learning. In particular, an integral component of the modern education is the introduction of distance learning courses both in the course of full-time and distance education. In the process of organization of the distance learning, the distance course becomes not only a source of knowledge, but also serves as a means of communication with the teacher and classmates at a distance. In the process of organization of the full-time education the distance course serves as a platform for organizing independent work and giving access to educational materials.

Though the problem of designing distant courses is not a new one but it still remains relevant enough. This is especially true concerning introduction of a new learning technology - mixed learning, as far as it involves a combination of various modern forms and methods, among which the distance learning technologies occupy a considerable role.

### 2. Preconditions and means for resolving the problem.

The problem of designing and implementing distance learning courses and distance learning at higher education institutions has been reflected in the works of the following national scholars: V. Yu. Bykov, Yu. V. Goroshko, M. I. Zhaldak, T. V. Kapustin, V. I. Klochko, T. G. Kramarenko, T. V. Krylova, V. N. Kukhareno, K. L. Bugaychuk, N. V. Morse, S. A. Rakov, Yu. S. Ramsky, S. A. Semerikov, E. M. Smirnova-Trybulska, A. V. Spivakovsky, Yu. V. Trius, V. I. Shavalova, S. V. Shokalyuk, as well as foreign ones: T. Anderson, J. Martinez, A. Kukulsk-Hulme, J. Traxler, T. Karsenti, R. Ferguson.

Analysis of the above-mentioned works allowed us to conclude that one of the effective ways of solving the problem of the quality of training specialists is the introduction of information and communication technologies (ICTs) into the education process, in particular, technologies and tools for electronic, distance and mobile learning are becoming topical. The combination of these technologies and their application in the educational process generates a new form of organization of educational activities - mixed learning, which becomes a promising direction of development of the methodological teaching systems.

Mixed learning allows to solve most of the problems that existed in the traditional education and in the process of organization of e-learning, distance learning and mobile learning, since it combines benefits of each of the technologies. For instance, if in the traditional teaching process it is very difficult to absorb a

large amount of information at classroom hours, application of information technologies contributes to rapid and high-quality mastering of knowledge (combination of traditional and computer-based learning). Using technologies of distance learning enables student to receive high-quality study materials in a short period of time, to have feedback from the teacher, and for the teacher - to evaluate objectively students' work by means of expanding the forms of evaluation (tests, questionnaires, essays, reports, etc.), to increase the productivity of independent work, to organize various types of activities by means of remote technologies (forums, conferences, webinars, chats, etc.).

However, the traditional education shouldn't be excluded from this system since it possesses a very important benefit – a direct contact with the student. None of the technologies delivers this feature since both the e-learning as well as distance and mobile ones make this contact indirectly via the computer tools. In this case, the substitution of personal communication by electronic tools takes place depriving the student of the possibility to form a culture of "live" communication, which is an important professional competence of any specialist.

### 3. The solution of the problem.

A precondition for appearance of the mixed form of learning is the development of e-learning, introduction of the distance courses and mobile learning devices (Table 1) [3, p.10]. Mixed form of learning combines benefits of the traditional and e-learning (including distance and mobile ones) and provides the opportunity to use a wide range of effective learning tools.

**Table 1.** *Development of e-learning*

Year	Technology	Pedagogical method
1980	Multimedia resources	Distance courses on the basis of behaviorism and cognitivism
1993	Web	
1994	Educational objects	
1995	LMS Blackboard, Moodle, Sakai	
1998	Mobile devices	
1999	Educational design	Distance courses based on constructivism
2000	Gaming technologies	
2001	Open educational resources	
2004	Social media web 2.0	
2005	Virtual worlds	
2007	E-books and smart devices	Distance courses based on connectivism
2008	cMOOC	
2010	Educational analytics	
2011	xMOOC	

In the current conditions, the introduction of distance courses based on the concept of connectivism involves the following principles [5]:

- learning is the process of forming a network of specialized units and sources of information (units may be presented by people, organizations, libraries, websites, books, magazines, databases, any source of information and knowledge);

- knowledge is in the network;
- knowledge can exist beyond the person, and technologies contribute to learning;
- ability to learn new – bigger accumulated knowledge;
- ability to expand and develop - much more important accumulation;
- learning and cognition are ongoing - it's always a process and never a state;
- key competency - the ability to see connections and the reasons between branches of knowledge, concepts and ideas;
- timeliness and urgency are necessary features of modern education;
- learning is always a choice and making decision.

Consequently, learning based on connectivism is an active process, which can be supported from the outside on the basis of the integration of information sources. This combination allows to develop and form a higher level of understanding.

Nowadays there exist such distance learning platforms (models) as xMOOC and cMOOC - mass open online courses (Table 2).

MOOC (massive open online course) – is a kind of online course in which a large number of participants can take part, while providing free, open access to all materials via the Internet. Recently, even a special term appeared - "Professor of the Mass Open Online Course" or "Professor 2.0" [1].

**Table 2. Comparison of xMOOC and cMOOC models**

xMOOC		cMOOC
More traditional distance learning organization model that focuses on the academic approach to learning (Coursera, edX, Udacity)	Concept	A model based on personal learning environments and networks involves active communication between participants.
Cognitive-behavioral and constructive	Approach	Connectivist
Are defined by the teacher	Goals of learning	Are defined by the listener
Computer science and engineering disciplines	Sciences to be studied	Pedagogical theories and humanitarian disciplines
Clearly structured	Educational materials	A large amount of information that does not have a clear structure
Is duplicated	Knowledge	Is created and generated
There are no observers practically	Participants	A large number of participants
Teacher performs his role	Teacher's role	Teachers perform different roles
Constant control by the teacher	Control	Absence of any control
Courses are open to everyone	Openness of the course	Openness to personalize learning, dialogue, discussions, conversations
Are supported by prestigious universities	Support	Private initiative of individual members of the pedagogical

		community
Well-funded	Financing	Not funded
Employees	Developers	Volunteers

The xMOOC model is supported in classical universities and focuses on the academic approach to material mastering.

The content of the courses is developed by professional teachers and experts in a certain subject area, the courses take place according to a strict curriculum and include specific tasks that involve the certification of participants and the assessment of their knowledge level. As the examples of this model may be cited Coursera (Stanford University and 13 other universities), edX (MIT, Berkley and Harvard), Udacity (Stanford University) projects that began their work in 2012 and function up to now.

The cMOOC model is based upon communication of the participants and discussing topics. cMOOC courses use the theory of connective knowledge (connective knowledge). This theory is based on the fact that learning takes place in a group of people connected via network who actively communicate and use blogs, wikis, and social networks to find knowledge. The main task of cMOOC participants is to search and submit of educational material through various forms and tools. Thus, the content of the connectivism course is presented and created both by the teacher and the students. S. Downs distinguishes four types of activities of the course participants: aggregation, remix, reuse and distribution [2].

In our opinion, the educational process in the classical university can be carried out taking into account two models. However, it is still recommended to choose xMOOC as the basic model, since it provides a clear curriculum, a goal, which is set by the teacher, an automated student monitoring system, etc. That is, such a model is organically combined with the traditional system of training.

The principles of the connectivism, inherent to the cMOOC model, can be set as a basis in the various activities of students in the distance course [4]:

- *cooperation*: the course offers links to various educational resources necessary for processing and further discussion. Students choose only those materials that are necessary for them at a particular time while studying a particular topic. The learning process in cooperation provides the student with an opportunity to get a general idea of the relevant section of the course;

- *remix*: the course materials are organically interconnected, so that the student, after working over the educational materials, should discuss the knowledge received on the webinars and on the forum, share the content with the other people;

- *re-profiling*: the main goal of the course is to help the participant acquire the knowledge necessary for him in further activities. And this is the most complicated part of the learning process, since the student starts learning not from scratch (the term "re-profiling" is used in the course, instead of "creation"), but analyzes the acquired knowledge and synthesizes his understanding of the educational material. The open course teaches how to read, understand and work with the content of other people and how to create his own new understanding. The course, as a rule, provides with the tools that can be used to create your own content;

- *message*: the task of the teacher is to organize interaction with the other students in this particular learning process. But the student can work independently without discussing the problems of the course in the group.

We developed and implemented in the educational process distance course "Technologies of web-applications development" (Fig. 1), which is based on the xMOOC model, but the elements of the connectivism approach are also present. In particular, on the stages of mastering the educational material and in the process of performing practical tasks.

The course is implemented in the process of preparing students of the educational degree "Bachelor" in such specialties as

view. In order to summarize the course material students are offered questions for discussions, the answers to which are impossible to

**Fig.1.** Main page of the distance course "Technologies of web-applications development"

014.09 (Computer Science), 6.040302 Informatics. 120 hours are envisaged for mastering of the discipline which is studied (4 credits ECTS), that in the mode of mixed training are to be spent in 10 study weeks, with a following weekly load for the student – 4 hours for classroom work, 8 hours for independent work. The main goal of the distance course is to help students create skills for developing web applications for using server scripts and tools for processing databases based on modern instrumental tools.

There have also been identified professional competencies that students will possess at the end of the course:

- demonstrate knowledge about the basic approaches to developing client and server parts of web applications;
- use advantages of the MVC model for developing web applications;
- be able to use code editors;
- be able to install and use integrated development environments (IDEs);
- have skills of working with a web server (WAMP);
- be able to use HTML, DHTML and CSS descriptors to create a web application layout;
- demonstrate advanced programming language in PHP;
- create interfaces for interaction of web applications with DBMS;
- be able to solve typical tasks on web programming.

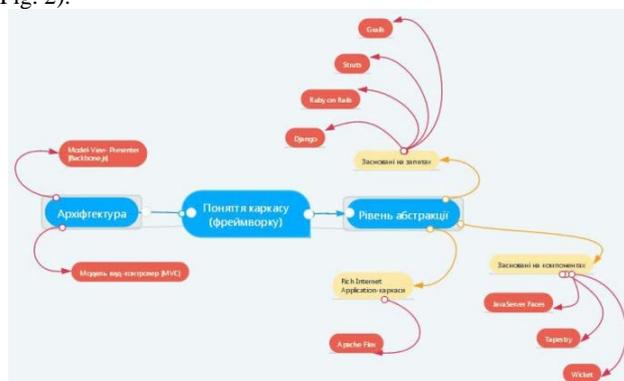
The competencies, acquired by the students, are expected to be demonstrated in the course of performing the following tasks: participation in discussions using active learning methods; demonstration of personal mind map for each topic; performing and defense of practical works on web programming; testing (current, final); performing of an individual educational and research task; credit.

Since the distance course is divided into weeks, the corresponding activities are planned for each week. For example, students are offered to get acquainted with the first and second topics during the first week. For this purpose the theoretical material is presented in the form of short video lecture (10-15 min.), text and presentation. It is important to note that the video lecture offers a brief overview of the theoretical information on the topic, while it is deeper presented in the text. For visibility and better understanding of the main provisions, presentation is used.

They are also supplemented by elements based on the connectivism approach. In particular, the list of additional resources is offered in which the topic is presented from different points of

find in the textbooks. For instance, the question "Which approach to web programming should be used when creating an educational site?" . To do this, students have to analyze educational websites, highlight their features, distinguish them from the other sites and explain the use of one or another approach. The discussion of the questions takes place at the class and outside the classroom at the forum, which is also in the distance course.

To consolidate the knowledge gained, students are encouraged to create a map of mind by means of any of online or local knowledge map editors - MindMeister, Bubbl.us, Xmind, etc. (Fig. 2).



**Fig.2.** An example of a mind map "The concept of a frame"

Mental maps are used as a kind of psychological toolkit, used for self-examination, thinking, cognition, for solving current problems, drawing up plans, dealing with deep mental processes and helping to study complex phenomenon or process. Knowledge maps help to analyze and structure large amounts of information as well as to recognize or memorize it.

The final stage in reinforcement of the theoretical provisions is testing. For each topic, 10 test questions are offered, which include different types of tests (Multiple Choice, Short Answer, Questions like "Correct / Wrong", Numeric, etc.). The test can be taken unlimited number of times, the main purpose is to consolidate knowledge. The necessary option in the test settings must be a passing grade. That is, in order to proceed to studying next topic, the student must score a certain number of points while passing the test.

Theoretical issues have no practical tasks, and only the introduction of active learning methods can "enliven" the course of

study, therefore the process of talking over and discussion is an obligatory element. Such activities are carried out in direct contact with students both in the audience and beyond. In particular, extra-curricular work can take place in frames of a webinar organized by a teacher and scheduled for a certain time.

Unlike traditional classroom lessons, the webinar requires special organizational arrangements. These activities include preparation and organization of the workplace, sending invitations for the webinar, placing announcements on the webinar, conducting a test webinar for the prevention of technical problems, developing and downloading materials for conducting a webinar (presentation, questionnaires, forms, etc.), etc.

After studying each topic students are also invited to go through an anonymous poll "How well did you understand the topic?". This poll is not rated, it can only be seen by the teacher. The purpose of the survey is improvement of the distance course in the future, as the students' answers allow us to understand how quickly and effectively one can study and understand the provided training material.

Questions are formed according to the psychometric Likert scale, which provides 5 gradations of answers: 1) is completely unclear; 2) it is not clear; 3) difficult to answer; 4) it is clear; 5) absolutely everything is clear. This grading from a minimum to a maximum allows to reflect the degree of confidence in one's knowledge and own feelings.

#### 4. Results and problem discussion.

To discover the effectiveness of introducing a distance course in the educational process we conducted a study, based on comparison of the levels of students' academic achievements. The study involved 32 students of Pavlo Tychyna Uman State Pedagogical University of the Department of Physics, Mathematics and Informatics of the specialty "Informatics" and was divided into groups - control (15 persons) and experimental (16 persons).

The first knowledge assessment revealed almost equal levels of student performance in both groups. In particular, in the control group (blue in the diagram), 10% of students have a high level, in the experimental group (yellow in the diagram) - 12%. The average level for the control group was 35%, while for the experimental group it was 37%. The indicators of a sufficient level are also different, for the control - 47, for the experimental - 45. Initial level: in control - 8%, in experimental - 6% (fig. 3).

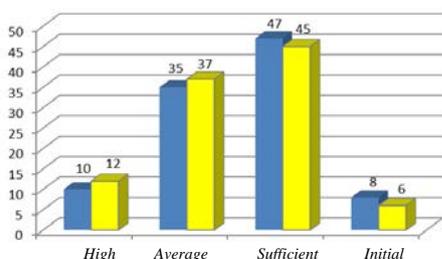


Fig. 3. Levels of educational achievements before the experiment

The next stage was to introduce a distance course and methods of active training in the experimental group, while in the control group training was carried out traditionally.

After implementing all the necessary elements of learning, we conducted the last (knowledge) assessment of student performance in both groups. The results of the second assessment show that the level of educational achievements of the control group students haven't changed practically, whereas in the experimental group a significant increase may be observed. In particular, it is possible to note a high increase for the average level of educational achievements in the experimental group, the indicator showed growth of 8%, whereas in the control group only 1%. It is also worth noting that there was a decrease in the number of students with an initial level of academic achievements, the indicator decreased by 3% for the experimental group and by only 1% in the control group (fig. 4).

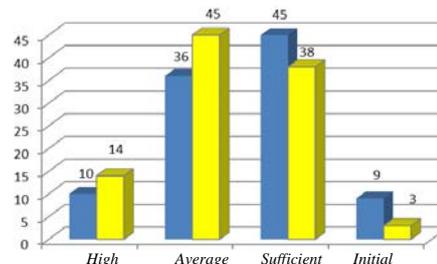


Fig.4. Levels of educational achievements after the experiment

The given research results allow us to conclude that the introduction of a distance course and the organization of the relevant activities have a positive effect on the quality of the specialist's training. Applied methods and teaching tools transform a passive student who perceives the educational material at the surface level into an active participant of the learning process, who is deeply studying the material and obtaining new knowledge through active mental activity.

#### 5. Conclusion.

The combination of different studying technologies enables students to intensify their activities, to intensify their mental activity, to promote the development of creative thinking, to form teamwork skills. The combination in the distance course "Technologies of web-applications development" of the xMOOC and cMOOC models gives a positive result and forms students' active learning skills, using external resources, in talking and discussions. The implementation of such a distance course allows to expand the range of educational opportunities, interaction and communication, creating conditions and revealing the prospects for learning and implementing in practice new forms and methods of study.

#### 6. References.

1. Carson, S. and Schmidt J.P. The Massive Open Online Professor. Retrieved from: <http://www.academicmatters.ca/print-issues/professor-2-0/>.
2. Downes, S. MOOC – The Resurgence of Community in Online Learning. Retrieved from <http://halfanhour.blogspot.ru/2013/05/mooc-resurgence-of-community-in-online.html/>.
3. Kukhareno, V.M. (ed) Teoriia ta praktyka zmishanoho navchannia. Kharkiv, «Miskdruk», NTU «KhPI», 2016, pp.284.
4. Kukhareno, V.M. Navchaljnyj proces u masovomu vidkrytomu dystancijnomu kursu. – Teorija i praktyka upravlinnja socialjnyjny systemamy, №1, 2012, pp.40-50.
5. Kukhareno, V.M. Suchasni tehnologiji distantsijnogo navchannya. Retrieved from <http://web.kpi.kharkov.ua/krio/wp-content/uploads/sites/41/2013/04/SUCHASNI-TEHNOLOGIJI-DISTANTSIJNOGO-NAVCHANNYA.pdf/>.