Innovative Educational Technologies, Tools and Methods for E-learning
Scientific Editor Eugenia Smyrnova-Trybulska
"E-learning", 12, Katowice–Cieszyn 2020, pp. 137–146
DOI: 10.34916/el.2020.12.12

DISTANCE TECHNOLOGIES IN THE TRADITIONAL MODEL OF HIGHER EDUCATION

Gennadiy Karimov[1], **Nataliia Kuzmenko**[2], **Tetiana Radchenko**[3]
DSTU, Kamianske, Dniprobudivska st. 2
[1]gkarimov@ukr.net, [2]sincerety@ukr.net, [3]tetiana.rad4@gmail.com

Abstract: *The paper discusses some aspects of the organisation of higher education based on distance technologies. It shows the advantages and disadvantages of distance form of higher education versus traditional full-time and part-time forms. It also considers the role of e-learning and m-learning technologies; the essence and features of blended (mixed, hybrid, combined) learning. The authors describe the experience of managing the educational process at a typical institution of higher education in the conditions of forced transition to distance learning. They allocate the main problems and possible solutions, proceeding from the conditions of efficiency and methodical expediency of certain forms and means. The conducted analysis allowed designing an adaptive fulltime-distance model of training, with the traditional model of higher education remaining unchanged. The proposed approach derives from the focus on the complete transfer of students' independent work to a distance mode for theoretical material and to a combination of full-time and distance modes for other types of work in a ratio determined by the specific situation. Besides, all preparatory issues are tackled at the beginning of the semester in order to train students to learn according to the proposed scheme.*

Keywords: higher education, distance learning technologies; blended learning; adaptive scheme.

INTRODUCTION

The COVID-19 pandemic has dramatically affected all spheres of society, including education. The educational process in Ukraine was forcefully transferred to distance mode in the middle of the school year (semester), without prior training. Consequently, both learners and teachers faced new challenges. Most participants in the learning process were not prepared for full transition to distance learning. Teachers mainly tried to use elements of remote technologies relying on provided electronic

versions of teaching materials as well as various ways of communicating with students (e-mail, messengers such as Viber, Telegram, etc.). In some cases, video conferencing was used via tools such as MS Teams, ZOOM, Google Meet, Skype, and specialised environments such as Classtime or Google Classroom.
The experience gained has drawn increased attention to the problems of distance education. Opinions of the participants of this forced experiment were divided: from calls to urgently redesign the entire educational process into remote format to a full denial of the feasibility of such a step. The arguments in both cases are quite strong, which determines the relevance of further research aimed at analysing the problems of education using distance technology.

1. DISTANCE LEARNING AND ITS RELATION TO OTHER FORMS OF HIGHER EDUCATION IN UKRAINE

The nature of discussions about the feasibility, advantages and disadvantages of distance learning is largely determined by certain inconsistency of the terminology used. For example, when determining distance learning a number of researchers pay attention, above all, to the physical distance between the participants in the learning process. Thus, there appear claims that this form of education was born at least 150 years ago and its equals the correspondence form of education. Other researchers, focusing on the defining nature of modern information and communication technologies, identify the concept of distance learning through the concepts of e-learning (e-learning) or m-learning (mobile learning).
We consider it appropriate to use the terminology of regulations currently in force in Ukraine. According to the Law of Ukraine «On Higher Education», the main forms of higher education are «… institutional (full-time (day and evening modes), part-time, distance, network forms); dual» (Zakon Ukraïni, article 49, paragraph 1). The network and dual forms of education will not be considered further due to their specificity.
Full-time and part-time forms can be considered traditional, the difference between them is in the ratio of students' in-class and independent work. The Law cited above provides for full-time classes and practical training for at least 30 weeks during the school year. For part-time form, the duration of the period between short sessions for training classes and assessment activities is fixed as no less than one month.
The distance form of higher education has shaped relatively recently. The Law of Ukraine On Higher Education defines it as «… individualised process of obtaining education, which occurs mainly through the indirect interaction of distant participants in the educational process in a specialised environment that operates on the basis of modern psychological-pedagogical and information and communication technologies» (Zakon Ukraïni, article 49, paragraph 4). As we can see, the distance between the participants in the learning process is common to both distance and distance forms of education. At the same time, the correspondence form of education designates short-term sessions for presence training sessions and assessment activities, and the distance form allows complete absence of face-to-face interaction of participants in the educational process. The fundamental specificity of distance form is a clear focus on the use of modern information and communication technologies. The reference to mod-

ern psychological and pedagogical technologies only reinforces this feature and emphasises the need to take into account the specifics of distance learning.

The main normative document regulating distance learning should be considered the Regulation on distance learning, approved by the order of the Ministry of Education and Science of Ukraine № 466 of 25.04.2013 (Положеннja pro distancijne navčannja). The provision allows the possibility of using asynchronous and synchronous training modes. The first mode involves the interaction of distance learning participants with a delay in time, using e-mail, forums, social networks etc.. Synchronous mode is defined as «… interaction between the subjects of distance learning, during which all participants are simultaneously in the web environment of distance learning» (ibid., p. 1.6). The main types of classes for higher education (lectures, consultations, practical classes) can be conducted in asynchronous or synchronous modes (ibid., p. 3.3, 3.5).

Importantly, the focus on certain information and communication technologies at the current level of society development is typical for any form of learning. This is evidenced by the widespread use of such concepts as *e-learning* (electronic learning) and *m-learning* (mobile learning). E-learning can be considered as the broadest concept among the two. Semerikov, Striuk, Moiseenko claim that in Ukraine «the following interpretation is widespread: e-learning is the presentation of educational materials and management of the learning process using new information and telecommunications technologies» (Semerikov et al., 2012, p. 197). It is clear that this approach can be used in any form of higher education.

Further development of the use of information and communication technologies in education is connected with the emergence of mobile devices (mobile phones, tablets, devices for reading e-books, etc.). As a result, we observe how *e-learning* gave birth to *m-learning*. This technology is characterised by high portability (including the ability to access wireless Internet), individual adaptation to a person, intuitive interface. As a result, the potential and opportunities for personalised learning are significantly expanded, in particular, the limitation not only to time but also by the place of study disappears. It is possible to organise professor-to-student interaction in real time, including the diagnosis of educational achievements (Rekomendacii JUNESKO po politike…).

Based on the regulations of Ukraine (1,2) e-learning and m-learning cannot be considered as independent forms of higher education. Present authors believe that it is more correct to differentiate between full-time, part-time and distance forms of educa-

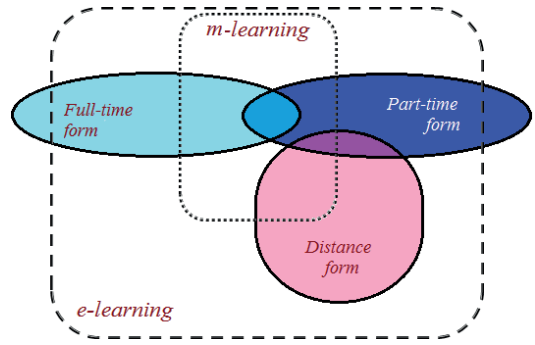


Figure 1. The relationship between forms of higher education in Ukraine

Source: own work.

tion, which actively (albeit to different degrees) use e-learning and m-learning technologies (Fig. 1).

1.1. Research methodology

In order to specify the content and features of various forms of higher education the authors used historical-logical and systematic approaches as well as the method of theoretical literature review. The theoretical background of the study relies on basic principles and provisions in the field of higher education, legislative and normative acts on higher education, monographic studies by Ukrainian and foreign scientists. Methods of observation and generalisation were applied when discussing the experience of using elements of distance learning in off-nominal mode; methods of system analysis and synthesis were employed to design the scheme of adaptive distance learning.

2. ADVANTAGES AND DISADVANTAGES OF DISTANCE LEARNING: BLENDED LEARNING

Distance learning has its own characteristics which determine its advantages and disadvantages compared to traditional full-time and part-time forms of higher education. There is significant literature on the topic (Semerikov et al., 2012; Bikov et al., 2015; Rams'kij et al., 2008; Smirnova-Tribul'skaja, 2007; Trius, 2012). A summary of the most significant features, as well as affordances and risks are presented in Table 1. Obviously, all the positive points are accompanied by quite significant challenges. Particularly noteworthy was the problem of minimising or lack of face-to-face interaction between a professor and a student. After all, it is the pedagogical skill of the professor, his or her ability to engage the audience, to form and maintain the creative nature of learning that largely determine the effectiveness of the entire educational process.

The desire to combine the advantages of traditional forms of higher education (full-time and part-time) and distance learning gave birth to so-called blended learning. In essence, *blended learning* is actually a combination of full-time (part-time) form with distance learning, and the ratio of each of them can vary widely. In Ukraine, blended learning is often interpreted as hybrid (Smirnova-Tribul'skaja, 2007) or combined (Trius, 2012) learning. Such interpretations seem to reflect the features of blended learning as a pedagogical technology more accurately.

The interpretation of term *blended learning* by Yu.V. Trius is indicative. He defines it as "a purposeful process of acquiring knowledge, skills and abilities, mastering the ways of cognitive activity by the subject of learning and development of their creative abilities based on comprehensive and systematic use of traditional, innovative pedagogical technologies and information and communication technologies of teaching based on the principles of mutual complementarity with the aim of improving the quality of education" (Trius, 2012, p. 304). As we can see, the concept of *distance learning* is completely absent in this definition. In fact, we are talking about supplementing the traditional full-time and part-time forms of higher education with elements of *e-learning and m-learning* technologies, which already takes place in practice (see Fig. 1). But the reference to *innovative pedagogical technologies* directs

professors' focus towards the need of detailed elaboration of methodological issues of combining traditional forms of learning with new technologies of presentation (acquisition) of knowledge.

Table 1

The main features of distance learning

Feature	Advantages	Challenges
Lack of strict regulation of the learning process in terms of time and location	The students has opportunity to: • independently determine comfortable learning conditions, including time, place and pace of learning material; • combine the learning process with other regular activities (work, other learning, etc.)	Comfortable conditions often lead to loss of focus. High motivation and self-discipline of applicant, their ability to self-control are required.
Shift away from group classroom work, individualisation of training	The student is no longer a hostage of the teacher's focus on *average* student; they get an opportunity to form learning trajectory independently	Lack of sharing experience with other students, the desire for leadership emotionally impoverishes learning
Online – communication of students with teachers and other participants	The use of modern means of communication, efficiency, similarity to everyday life patterns	The negative consequences of electronic communication remain due to the psychological characteristics of participants
Online assessment of students	Eliminating risks of subjective assessment, convenience for students and professors	Problematic identification of students and checking the independence of testing
Availability of high-quality educational materials	Abundance of educational literature, the opportunity to attend lectures of leading experts etc.	Perception of material presented at a high level requires previously accumulated knowledge of the appropriate level

Source: own work.

3. FORCED LEARNING IN DISTANCE MODE

One of the positive features of distance learning is the ability to use appropriate technologies in situations where traditional classes become impossible for reasons beyond the will of the participants in learning process. Until recently, the main reason was the imposed quarantine in a separate educational institution or its unit. The COVID-19 pandemic has led to a strict quarantine in March–April 2020 in most parts of the world. Full-time classes in educational institutions of Ukraine were initially suspended and later the educational process was transferred to distance mode (Pro organizacijni zahodi…). The education system has gained a unique experience of unprepared mass transition to distance learning.

The recommendations of Ministry of Education and Science of Ukraine regarding work in quarantine conditions were mainly reduced to a reference to the Regulation (Položennja pro distancijne…). This regulation is intended for use in an institution with distance learning as a separate form of education. The Ministry of Education and Science of Ukraine suggested that educational institutions determine the procedure for the use of distance learning technology for students of other (except the distance one) forms of education by themselves. The above-mentioned Regulation «… can be used as a guide» (Informacijnij portal Dniprovs'kogo…). Thus, educational institutions as a whole and individual professors were given ample opportunities to find the optimal organisation of the educational process in conditions of forced transition to distance mode.
The analysis of preparedness of higher education institutions (HEIs) to operate in new conditions gives grounds to divide them into three groups. The first group includes those HEIs where the distance learning has already been used, i.e. the ones where certain elements of distance technologies were already implemented. The second group consists of HEIs, in which elements of e-learning and m-learning technologies were used sporadically in teaching particular disciplines. Dniprovsky State Technical University (DSTU) can serve as an example of the second group. Below we discuss the university's experience as to individual units and trained personnel below. The third (most numerous) group comprises those HEIs where distance learning as a special form of obtaining higher education was not used, but some aspects of the organisation of education were actively implemented for full-time education in the conditions of forced transition to distance learning.
First, it should be pointed out that DSTU was almost ready to use the asynchronous distance learning mode. According to the above-mentioned regulation, such a mode provides for the interaction of participants in the educational process with the time delay, using e-mail, forums, social networks, etc. In due time at DSTU the Information Portal (Rekomendacií ŝodo organizacií …) was launched, where one can find information for each discipline of the curriculum, namely syllabus, programme of study, synopsis of lectures, methodological guidelines for practical (laboratory) classes and independent work of students as well as other material. The only remaining thing to be implemented in the transition to distance learning was to inform the students about the calendar planning of the educational process and communication channels with professors.
To address this issue the enthusiast professor O. Shumeiko developed "Student-Professor Distance Exchange Information System" (SPDEIS) in the DSTU website. With its help the professors were able to inform students about all the nuances of the educational process as well as to send the necessary materials. The students were given the opportunity to contact the professors if they needed extra help with particular theoretical material or algorithm of carrying out practical tasks; to send a report on the completed practical assignment, etc. The introduction of authorised access provided personal service and certain level of confidentiality of communication. E-mail and messengers (Viber, Telegram, etc.) have become backup communication channels.
Synchronous mode is defined as "… interaction between the subjects of distance learning during which all the participants are simultaneously logged on the web environ-

ment of distance learning" (Položennja pro distancijne navčannja, p. 1.6). Typically, synchronous mode is implemented by using video conferences with the help of such tools as MS Teams, ZOOM, Google Meet, Skype and others. The use of synchronous mode in the transition to distance learning at DSTU has caused some difficulties as it turned out that not all professors and students were familiar enough with communication technologies. As a result, the difficulties of using the tools of interaction in many cases have become dominant in the organisation of educational process, and the study of a particular discipline of the curriculum has lost attention. The same applies to attempts of using specialised environments such as Classtime or Google Classroom.

Knowledge assessment of students appeared a significant problem of distance learning (see table 1). The Ministry of Education and Science of Ukraine formulated special recommendations in this regard, making a warning: "The recommendations complement, but do not replace the best practices and solutions that the educational institutions have already developed and implemented under quarantine restrictions" (Rekomendaciï ŝodo organizaciï). With this in view, we used the algorithm of holding examinations which was based on the above-mentioned information system.

According to the schedule on the exam day the student must log in to the system at a specified time. After authorisation each student is sent information about the procedure of the exam through the same system and there opens a test to assess student's knowledge of theoretical material. The time to complete the test is limited and the evaluation is performed automatically. After closing access to the test, the system SPDEIS sends each student individual set of practical exercises. Files with the answers are sent to the professor again through the SPDEIS no later than the deadline. The time to complete the exercises is also limited. Taking into account the results of practical exercises and assessment of the test, the professor sets the final grade for the test and informs the student about it.

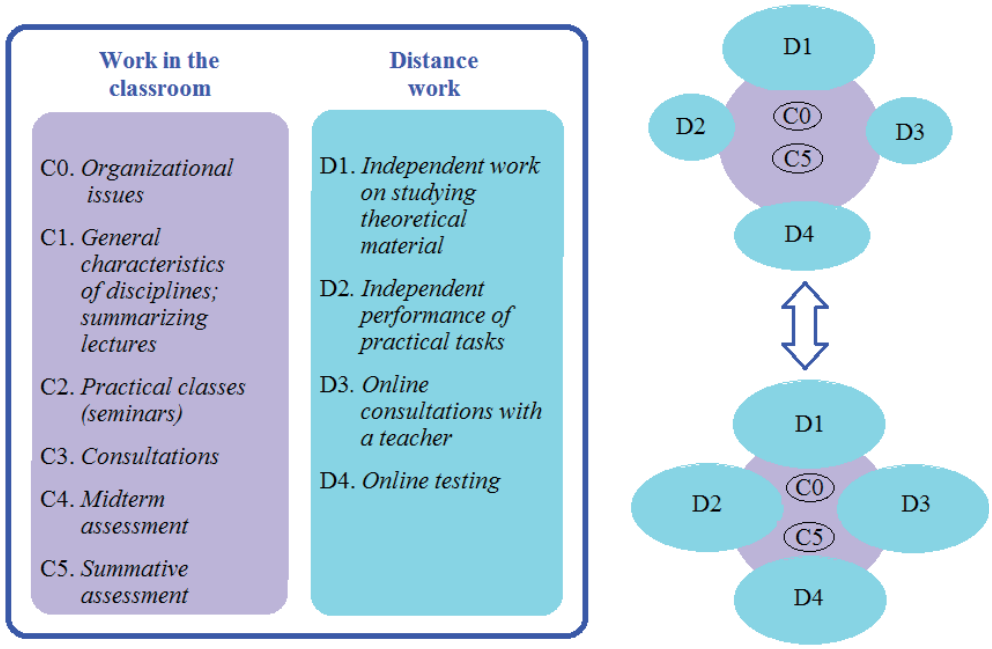
Using the approach described above, professors and students generally coped with the situation despite the problems that arose. The main issues were technical, psychological and methodological. Among the technical problems the most common ones were the unequal opportunities of students due to the presence or absence of appropriate gadgets (PCs, laptops, tablets, smartphones, etc.) and the quality of Internet access. Psychological problems are primarily related to the unwillingness of many students for active independent work, including time management, adherence to the proposed schedules of training work, development of new learning environments and means of communication. Despite the comfortable working conditions at home, lack of constant support by the teacher led to a fall in focus and procrastination.

In truth, many students lacked live communication with professors and student colleagues. Methodological problems have arisen because distance learning requires other approaches. In particular, this applies to the planning of the educational process, the distribution of the student's time budget for lectures, practical classes, consultations and independent work. It turned out that the student spends much more time on practical classes and independent work than in the traditional model of higher education; thus the need for professor advice, including in individual mode, is growing significantly.

4. ADAPTIVE FULL-TIME AND DISTANCE LEARNING MODE

Evidently, the transition to distance learning technologies, as circumstances may require, will be much easier if elements of distance technologies are used systematically in the traditional model of higher education. For this reason, we propose to apply the *Adaptive full-time and distance learning scheme (AFDLS)* while maintaining the traditional model of higher education on the whole (cf. Figure 2 for details).

When using AFDLS, from the beginning of every semester the participants of the educational process should be prepared to combine classroom and distance work, and the proportions of such a combination may be changed during the training, depending on the specific situation. The components C0 and C5 remain unchanged, which, in any case, provide face-to-face communication between professors and students, as well as component D1, which is fully realised in distance learning mode. We would like to emphasise that the focus is on studying theoretical material only in the part that is under the syllabus precisely aimed at independent work. Components D2, D3 and D4 can be changed if necessary due to components C1–C4 (cf. Figure 2). Before the beginning of training it is necessary to fix the scope of the specified components at a level which is sufficient for skill formation related to using corresponding technologies and means.



F i g u r e 2. Adaptive full-time and distance learning scheme in the traditional model of higher education

S o u r c e: own work.

The effectiveness of the aforementioned learning scheme significantly depends on the elaborate organisational issues (component C0) and the rational distribution of academic work between components C1 and D1, C2 and D2. In class the teacher must outline the problems and focus on the most important or difficult matters, all the rest is transferred to distance learning mode and is based on e-learning and m-learning technologies.

CONCLUSIONS

Of all the forms of higher education provided by the Regulations of Ukraine, the main ones today are traditional full-time and part-time forms of education. Distance learning is actively developing, but it is too early to consider it one of the leading forms. The advantages of distance learning are connected with systematic use of e-learning and m-learning technologies, and the disadvantages are related to the lack of face-to-face communication between students and professors.

Blended learning is a progressive trend of higher education; its essence is a combination of full-time (part-time) form of education with distance learning and it is based on sound pedagogical grounds and methodological support.

The experience of forced transition of higher education institutions to distance learning mode indicates the need and possibility of such design of the educational process which will not be disrupted by emergencies of various kinds. The use of the adaptive full-time and distance learning scheme, with varying proportions of classroom and distance work during the semester, provides a smooth transition to distance learning in the case of off-nominal situations.

REFERENCES

Informacijnij portal Dniprovs'kogo deržavnogo tehničnogo universitetu. Retrieved from http://www.dstu.dp.ua/Portal/WWW/ (accessed 16 July 2020).

B i k o v, V. Ju., G r i c e n č u k, O. O., Ž u k, Ju. O. (2015). Distancijne navčannja v kraïnah Єvropi ta SŠA i perspektivi dlja Ukraïni. *Informacijne zabezpečennja navčal'no-vihovnogo procesu: innovacijni zasobi i tehnologiï*: kol. monografija. Akademija pedagogičnih nauk Ukraïni, Institut zasobiv navčannja, K.: Atika, 77–140.

Položennja pro distancijne navčannja. *Nakaz Ministerstva osviti i nauki Ukraïni № 466 vid 25.04.2013* (iz zminami zgidno z nakazami Ministerstva osviti i nauki № 660 vid 01.06.2013, № 761 vid 14.07.2015). Retrieved from https://zakon.rada.gov.ua/laws/show/z0703-13 (accessed 15 June 2020).

Pro organizacijni zahodi dlja zapobigannja poširennju koronavirusu COVID-19. *Nakaz Ministerstva osviti i nauki Ukraïni № 406 vid 16.03.2020*. Retrieved from https://mon.gov.ua/ua/npa/pro-organizacijni-zahodi-dlya-zapobigannya-poshirennyu-koronavirusu-s-ovid-19 (accessed 18 July 2020).

R a m s ' k i j, Ju. S., U m r i k, M. A. (2008). Ogljad distancijnogo navčannja v Ukraïni. *Teorija ta metodika navčannja matematiki, fiziki, informatiki:* Zbirnik naukovih prac', Vipusk VII:

V 3-h tomah, Krivij Rig: Vidavničij viddil NMetAU, T. 3: Teorija ta metodika navčannja matematiki, 42–51.

Rekomendacii JUNESKO po politike v oblasti mobil'nogo obučenija. Retrieved from https://iite.unesco.org/pics/publications/ru/files/3214738.pdf (accessed 18 July 2020).

Rekomendaciï ŝodo organizaciï potočnogo, semestrovogo kontrolju ta atestaciï zdobuvačiv fahovoï pered viŝoï ta viŝoï osviti iz zastosuvannjam distancijnih tehnologij navčannja. *List Ministerstva osviti i nauki Ukraïni № 1/9–249 vid 14.05.2020.* Retrieved from https://mon.gov.ua/ua/npa/shodo-organizaciyi-potochnogo-semestrovogo-kontrolyu-ta-atestaciyi-zdobuvachiv-osviti-iz-zastosuvannyam-distancijnih-tehnologij (accessed 9 July 2020).

S e m e r i k o v, S. O., S t r j u k, M. I., M o i s e є n k o, N. V. (2012). Mobil'ne navčannja: istoriko-tehnologičnij vimir. *Teorija i praktika organizaciï samostijnoï roboti studentiv viŝih navčal'nih zakladiv*: monografija. Kol. avtoriv; za red. prof. O. A. Konovala, Krivij Rig: knižkove vidavnictvo Kireєvs'kogo, 188–242.

S m i r n o v a - T r i b u l ' s k a j a, Ye. N. (2007). *Osnovy formirovanija informatičeskih kompetencij učitelej v oblasti distancionnogo obučenija*: monografija. Herson: Ajlant, 704.

Ŝodo zaveršennja 2019/20 navčal'nogo roku. List Ministerstva osviti i nauki Ukraïni № 1/9–178 vid 27.03.2020. Retrieved from https://mon.gov.ua/ua/npa/shodo-zavershennya-201920-navchalnogo-roku/ (accessed 18 July 2020).

T r i u s, Ju. V., G e r a s i m e n k o, I. V. (2012). Kombinovane navčannja jak innovacijna osvitnja tehnologija u viŝij školi. *Teorija ta metodika elektronnogo navčannja: zbirnik naukovih prac'*. Vipusk III, Krivij Rig, 299–308.

Zakon Ukraïni «Pro viŝu osvitu» (vid 1 lipnja 2014 roku № 1556-VII, Redakcija vid 12.07.2020. Retrieved from http://zakon5.rada.gov.ua/laws/show/1556-18 (accessed 1 June 2020).