

UDC 378.147:52:38.094(430+477)

## PROBLEMS AND DIFFICULTIES OF ONLINE STUDYING THE DISCIPLINES OF ECONOMIC AND MATHEMATICAL CIRCLES

**Elina Zhelezniakova**

Candidate of Physic-Mathematical Sciences, Associate Professor of  
High Mathematic and Mathematical Methods in Economic Department  
Simon Kuznets Kharkiv National University of Economics

Kharkiv, Ukraine

ORCID ID 0000-0001-6409-4761

*Zheleznizkova@m.hneu.edu.ua*

**Tetiana Silichova**

Candidate of Pedagogical Sciences, Associate Professor of  
High Mathematic and Mathematical Methods in Economic Department  
Simon Kuznets Kharkiv National University of Economics

Kharkiv, Ukraine

ORCID ID 0000-0001-5003-2711

*tas.20.05.72@gmail.com*

**Abstract.** The article discusses the main issues and problems associated with the transition to online learning in the high system school. It is outlined the difference between distance learning in the traditional education system and full online training. There are presented the dates of the world statistical studies in this direction, determined the problems that arise within the framework of the higher education system during the transition to full online training. The article shows that such kind type of education is fairy new direction, and a large number of the universities may take a lot of difficulties and of different nature when introducing it.

It was emphasized that the main problem of using this type of training may be the fact that as result of its implementation, the structure of competition between higher educational institutes can be radically changed. The main problems and difficulties of such kind online learning and teaching, control problem of acquired knowledge are opened and discussed on the example of teaching the discipline “Probability Theory and Mathematical Statistics”. According to the authors, for the successful functioning of online training it is needed to reduce the number of students in the group, to provide the teacher with technical and material support; to increase the part of active asynchronous components; to think about optimization of the control knowledge system.

**Key words:** online learning; distance learning; university; economic and mathematical disciplines; training course.

**Problem setting in general.** The global problem, Corvid-19 epidemic, which covers the world in the first half of 2020, almost completely changed the alignment of forces in many areas of human life and activities, and of course couldn't help but affect such an important sphere of society as education.

Thus, most of educational institutions, from elementary schools to universities, have switched to online learning, or simply speaking to distance learning. Perhaps,

after the recession of the epidemic and the decreasing of the number of sick people, educational institutions will return to the traditional form of education, but the fact that the structure and approach to teaching will be changed is obvious. This can become especially acute to the higher education system. Thus, the school system is essentially more stable and the process of education in different schools is almost the same. In addition, schoolchildren are children who, as a rule, are limited geographically, and do not have a much choice as such. Higher education is fundamentally different on this way. In this case, it goes not only about getting a profession and future job.

University education is generally other, it is characterized by variability, and applicants choose not only the future profession itself, but also the peculiarities of training in some of higher institution as a whole. So, during the second semester of the last academic year, almost all educational institutions in the world switched to distance learning. It would be wrong to say the distance learning is something new, developed only in these realities. Elements of distance learning have been almost universally applied in one or another form in various universities. The peculiarities of distance learning, the platforms on which it is carried out, are the subject of controversy and discussion among various specialists in the field of education.

Despite the apparent disagreements in this direction, it's obvious that the introduction of the distance component in traditional education makes higher education of higher quality and more accessible (Timofeeva, 2011; Snegurova, 2010).

Really, one of the lots of advantages of distance learning is the real possibility of the fullest consideration of the individual characteristics of students and their educational needs. So, for example, while studying distance courses, the pupils or students haven't any reference to place and time of their training, and this fact stays everybody practically in the equal conditions. If we talk about distance learning as a part of traditional education, then its greatest advantages include: using of modern educational platforms; strengthening of the electronics (computer component), thank to which the "machine" or computer supply of material is much easier to keep up to date than its paper copy; improving the quality of material presentation (presentations, computer tests, audio and video visualization) and much more.

The student's personal qualities are also expanding: the ability to work in conditions of uncertainly, to find solutions and communication opportunities independently are developed. To some extent, teachers' time is also saved; the forms of presentation of educational material are changing easy and quickly. And due to the circumstances prevailing in the world, the part of the distance component is education can significantly increase.

**Analysis of publications.** Let's first analyze the current situation. First of all, it should be noted that world education is faced with such problem for the first time, and

there is not enough scientific literature or extensive statistical research in this direction. However, the study of the results of different researches, forecasts, our working on this field allows us to draw some conclusions.

Firstly, modern universities have loosed the status of such kind educational institutions that provide only amount of fixed knowledge. Today, they are more of some educational, scientific and research centers, where young people learn communication, get experience of speaking in front of large audiences, learn to see the advantages and disadvantages of others, evaluate their own opportunities to form new contact, build professional relationships, independently acquire new knowledge, participate in group projects and research. All this can be loosed in most of cases by the full online training, and especially the biggest problem is the development of the socialization factor.

Secondly, in such format of learning (online) is the question of control of knowledge, encouragement of more diligent students, adjustment of the issue of workload with educational material, as for groups of students as for some students separately opened.

It is necessary to agree with the fact, that with traditional teaching exist more broad varieties for a teacher for adequate control of knowledge, for organization support and help for students, and in general way, the interaction “student – teacher” is expressed more clearly and at the same time not only professional part of both personalities are involved in educational process, but the personal characteristics too, and it is very important. As consequence of the fact that there is still no threat of “direct” control from the teacher (in the case of online learning) for the student, the phenomenon of “demotivation” or relaxation is quite clearly traced.

So, in many cases, the most part of the students looks at the quarantine as at a kind of vacation, and at first they practically don't come to study online, or don't and send their homework, if they were not fool completed, the tests are passed with the thinking “may be today I can be lucky”, and they usually take enough low scores by really loyal control system.

As for the situation in 2019/2020, it should be noted that in this case this problem was felt, not so acutely, and was practically smoothed out, due to the traditional training in the first semester. As a result, the teacher and students knew each other and were adapted to the requirements, opportunities and presentation style, assessment criteria of their estimations and requirements, personal characteristics.

The next significant problem in the case of online training is the question of the technical realization of this process. If the training comes from home, then both parties of education process should be able to implement it technically simply: have a good Internet, a computer, and appropriate software and etc.

Moreover, it should be noted that in this case stays an acute question of the same opportunities for each subject of the educational process. The question can be stayed look like: “Who should provide this?” In addition, it is necessary to add, that it is not always easy for teacher to go online so simply for half day from his own apartment, and living conditions of any person must be taken into account. In this case the best option would be actually classes, but from the walls of the university premises specially equipped for this.

The situation is especially complicated when it comes to real online learning, when students and teachers go to pairs according to real-life schedule. In this case, one more technical problem is added here: the possibility of the technical implementation of such a project from the university sides: to organize the powerful technical support, which is necessary to withstand such kind pressure.

There is another really weak link, especially in modern Ukrainian realities - laboratory and practical works (seminars). So, for example, students of higher medical institutions, from the second semester of the first year of their education, spend most of their studies in various anatomical laboratories, where the clarity and reality of the presentation of the given material is the basic of their training.

Practically, the same situation can be observed in many other educational areas (chemical industry, pharmacy, aircraft construction, etc.). Thus, in the context of the introduction of full distance learning, most of all of discussed here can be realized only by universities with a powerful technical and teaching potential technical difficulties. Based on the foregoing, it is obvious that a university that today successfully combines traditional and distance learning will not always benefit from the transition to distance learning.

The situation can be just different, if a university hasn't a powerful technical base. And the variability and availability of online courses, which can be seem at first looking, can play sometimes only negative role.

In the system of traditional education, very often with choosing of a profession (it is not a secret for anyone that such popular professions as economist, lawyer, translator, etc. are offered by almost every Ukrainian university), the determining factors are the price of training, the localization of the university (kind of city, how it is far from home and etc.), the cost of a hostel and their availability, and other more “everyday” privileges and advantages often.

In the case of the introduction of full online training, all these factors, with the exception, perhaps, of the price of education will lose all significance. For example, a student is ready to study in one of the foreign countries under a free education program, he has successfully passed the language exam, entrance tests, but in the case of a

traditional educational system, the dream may not be realized due to financial inability to pay for living in some country.

In case of widespread introduction online learning process all of these factors are not significant more. The choice of somebody can be determined by the future profession, the prestige of the diploma, and of the possibilities and opportunities by offered courses only. And, if we like to talk about Ukrainian realities, and in considering that a lot of parents and children believe that high-quality foreign education is the key to successful future, stays a very important question: “Will this trend a cause an additional outflow of students from domestic universities or not?” (Why is It Profitable to Enroll in a Foreign University During a Pandemic, 2020).

Thus, in this case, or we will have a full online training during all education period, or will have only some of introducing into separately online courses during semester, the structure of competition between higher educational institutions will be radically changed. And it may be happened that all those factors that are significant for a student today will be completely irrelevant tomorrow.

Other question is the problems, which are jointed with education of foreign students. About it is necessary to talk separately. There are a lot of difficulties in this way. Two factors exist, which made a possibility to attract foreign students for a study in the universities very important. There is a financial factor (it isn't any secret, that a foreign students pay much more as domestic students) and not less important factor that the number of foreign students, which are present at the university is as a kind of advertising and popularization of the university in the world.

But in this case, the problem of quality of the proposed training is especially acute. Especially, it is important a question “of a class's coordination in time”. So, if, for example, we can introduce our training according to the schedule of students, which of course can be organized through certain platforms, and for example, in general way it is not difficult to organize a video conference for “live” communication and answering questions. But how this can be realized if the group consists of different (by country of residence) students and at the same time they have a huge difference in time? In this way, it is possible to solve the situation, for example, by creation a high-quality a video lecture course, but they (materials) must be really high-quality, and competitive.

And this is not only the additional work of teachers, which must be paid; it is the technical capabilities of a higher educational institution too. In this direction, it should be noted that the leading universities of the world welcome just such an asynchronous teaching, where lectures, laboratory classes, as a rule, are high recorded video-materials.]So, according to the latest data of scientific researches, with the introduction of online learning has occurred a redistribution of competition between universities,

and many universities in the world are taking additional measures, leading a number of incentives to attract students for a study.

For example, during the last time, a lot of universities in Europe and the United States offer the opportunity to enroll and start studying online, and then transfer to full-time studies at the first opportunity, and online study period is 20%-30% cheaper for students as a traditional one. To this, as it is mentioned above, can be added the fact, that it doesn't necessary for student to pay additional money on rent and food. Some universities, in order to simplify the situation, do not require a language certificate an advance, the exam is usually taken directly inside the country at the university itself, which greatly simplifies the admission procedure itself. (Why Is It Profitable to Enroll in a Foreign University During a Pandemic, 2020).

Another attractive factor is the extension of admission of study, the introduction of forms of traditional education, especially in small groups, which provides direct student-teacher contact. It, for example, it was realized in the Netherlands, the lessons in a traditional form were gradually introduced during the summer semester, when the epidemic situation was not so acute. In Russia the questions of personalized support and help for students whose families suffered from consequences of quarantine were also raised, despite it is not so easy to realize, because a most students pay for their education (more than 53,5%). (Kostenko, 2020; Sidorova, 2020).

Of course, the epidemic, and as result, the wider introduction of online learning will change the market of educational services itself, and many areas of education and universities will "go down" in this situation. Thus, according to forecast, US universities expect that the number of students may decrease by 25% compared to last year, and therefore some high educational institutions and schools are increasing the deadline for accepting documents, weakening the requirement for training. All of issues and problems, which have discussed above are not only problems of Ukraine, they are global problems in the education market of the world. This is only question in the level of their severity (How USA Higher Education is Surviving a Pandemic, 2020).

Despite the fact that the purpose of this article was to study online problems within the framework of higher school, for better understanding it is necessary to address the problems that arose during studying children in secondary school, because yesterday's pupils are today's students. And the secondary school system of Ukraine, unlike Ukrainian universities, turned out to be practically not ready for this type of work. Thus, according to the latest polls, only 0,9% of Ukrainian schools fully met the criteria for online learning, 94% of schoolchildren did not use any training programs, only received assignments and their tasks in the form of paragraphs though mobile messengers such as Viber or Telegram. Which is also evidence of what kind of student

will come to study at the university and for what he (she) reads for. (Studying Online: a Choice: How Quarantine Will Change School Education, 2020).

**The purpose** of the article is to analyze the current situation in the educational services market and find out the positive and negative aspects of the introduction of online education; analyze the risks it carries for the modern higher education system; outline possible ways to overcome them.

**Results.** We will show how was organized online training at KhNUE S. Kuznets during a quarantine time on the example of economic and mathematical disciplines. This process (online learning) was based on the personal educational platform (PNS). It's necessary to note, that PNS isn't anything new, and in the previous time (traditional education) students and teachers used it actively. Usually each teacher (a lecturer) placed (places) on his page material corresponding to the course of teaching, and until to the full transition to online training, the PNS system site had a role of additional material for studying, which helps to understand the material after lectures, practices and laboratory works better.

During the quarantine period, when students studied online, the submission of material and its structure was changed significantly. First of all, it should be noted that the preparation for kind form of such a form of education (online lessons) required much more effort and skills from a teacher. For it preparation was needed to spend more time as in the case of ordinary lessons, were a lot of difficulties in material presenting, and as result large number of topics were studied in a shortened way, some were skipped.

Despite the mathematics and mathematical disciplines are one of the few fundamental and natural science disciplines that do not require a special laboratory base and visualization, and converting them to the online learning must be easy going, the structure of the presentation was the first difficulty. For example, if it's talking about lecture material. Usually, the PNS website contains lectures written according to the topics of the work program in a strong mathematical form with lot of mathematical definitions and evidences. But the teacher usually comments, explains in a simplified way, this or that mathematical fact, answering students' question in simple language, and has the opportunity to immediately do this or that action on the blackboard, which explains the statement incomprehensible to the student during the process of giving lecture in ordinary way. Thus, have listened to the "live" lecture, it is much easier to understand its strict mathematical analogue in the form of a text file on the PNS website.

The second difficulty was the problem to organize the online education process. So, it was the fact that in the beginning, most of the students treated the quarantine as some additional vacation, and practically did nothing. After some time, the situation

was changed, and result's marks (credits, exams) in the same groups almost completely coincided with the first semester of the 2019/2020 academic year, when students studied in regular classes into the walls of the university.

Of course, one cannot write off the fact that during the first semester most of the students and teachers were familiar, and this greatly facilitated the interaction of both sides of the educational process. Two types of interaction were used in online training: synchronous (according to the schedule time), asynchronous (posting materials on the PNS website). As a rule, in the synchronous mode, students received materials, lectures, practices, laboratory work, links to additional material and much more.

For the convenience of joint work of teachers and students, at the beginning of each working week, students received a work plan for the week. So, for example, they knew the topic of future lectures, practical and laboratory classes, types of control, and deadlines for completing tasks. This made for them possible to organize, plan your work schedule for a week, to understand the situation and independently, and if it is necessary to get an advice from a teacher in time.

And the third difficulty was the process of monitoring the work of students and estimation of gained knowledge. If we talk about flow control checking current homework, laboratory work, consultations, and all look like it, then the question on this direction was quite acute.

So, in the realities of Ukrainian higher education, completely each teacher has a huge number of students, and it is difficult to carry out high-quality control under the condition of traditional training, and upper the condition of online studying it is almost impossible. The same situation is with online consultations. If we talk about organization group control works, then Moodle system provides unlimited possibilities on this way. There are the options from simple sending of completed works in the form as texts files, to the passing tests of various forms and levels possible. Let's give in more detail the course "Probability Theory and Mathematical Statistics".

**Organization of lectures.** Lectures were held synchronously in the form of online conferences Zoom; this made it possible for a teacher not only to tell the new material to the students, but to answer questions and to compensate a live communication. The presentation of the lecture and its text in a more adapted version were posted on the PNS website.

**Organization of practical and laboratory classes.** Most cases practical and laboratory exercises were carried out in asynchronous mode, since it is technically difficult to organize such kind of class work synchronously. The students received the corresponding files with a detailed analysis of the tasks on the topics, and also received homework for them which had to be completed and sent to the teacher on time.



It should be noted that the terms of such work were long enough (not less as a week), and each student had the opportunity to complete its work, regardless of location place. The activity during the time of working, of course, was taken into account by the teacher, but mistakes and shortcomings in the homework did not carry a negative load for the students, since in this case the learning process was their performance.

If the teacher had enough time and had small number of students, each work was checked separately, and results' file was posted on the PNS website after the expiration of the homework assignment, where each student could receive and read comments on the work done. If the teacher was limited in time, and the number of students was large enough, then after the expiration of the term for completing the work, the teacher exhibited a completed file with detailed solution to the previously assigned homework, and each student checked the correctness of the task independently.

**Organization of consultation.** The organization of consultation was weakest link in the online work. So, it was nearly impossible or technically or physically to organize consultations for a large number of students with high results and with high quality. Therefore, communication with students was realized or per different messengers, or in process of online lectures, or on the PNS website in the ordinary way "written question - written answer". In framework of their possibilities teachers gave a help for students in analyzing of material.

**Organization of control over the acquired knowledge.** As mentioned above, to control the acquired knowledge, as a rule, were used all capabilities of Moodle platform. For example, for the homework checking was used the answer option "Assignment". Namely, it was formed a folder for a students' answers in the form of files, it was opened in time for a week, and each student had opportunity to put a file (files) with its solution at a convenient time. As for direct control work (practical control work and theoretical one) were used as a rule tests of various types.

So, if it was a "small" small control work, then it was usually a multiple choice test. If the test work was large and voluminous, then in this case the capabilities of Moodle platform test system were usually used more widely. There were also questions, which involved the choice of the answers or giving the answer in "writing" form with a full describing the form of it decision (the type of question "essay"). It was also taken into account multistage of assignments in exam passing time. Usually, exam questions were divided for three types, or three levels from simpler to complex. So, the first type of question was diagnostic, it involved checking the acquired knowledge, therefore, as a rule, the types of questions were simple and composed according to the "multiple" choice questions mostly.

The second type of questions was stereotyped. Here the tasks were already more difficult, and one task usually contained several questions, in accordance with which it

is necessary to put several answers (corresponding questions). And the third type of task is a heuristic task with a detailed form off the answer, where the student described completely both parts: the method and the way of solution, and they were checked by the teacher.

**Conclusion.** As mentioned above, the introduction of the distance component really improves modern education, expands its possibilities but very few universities can afford the transition to full online education. For the successful functioning of online training at least is needed:

- significantly reduce the number of students not only in the group, but also as load for a teacher as a whole, in any other case, contact with each student is impossible;
- provide the teacher with both technical and material support: preparation of online courses required certain skills and time cost;
- to increase the part of active asynchronous components, for example, in the form of high quality recovered lectures. The best universities in the world use this particular methodology, since it allows to solve the problem of the time workload of training platforms, the time difference for foreign students, and, if necessary, and clarification of the material, multiple viewing is possible;
- to think about optimization control knowledge system.

## REFERENCES

1. How USA Higher Education is Surviving a Pandemic. (2020). URL: [unipage.net/ru/1867](http://unipage.net/ru/1867).
2. Kostenko, J., Sidorova, E., (2020). Visa-Free Traveling: How the Coronavirus Has Affected for Paid Education. URL: <https://iz.ru/1007753/iaroslava-kostenko-elena-sidorenko/bezvuzovyi-rezhim-kak-koronavirus-povliial-na-platnoe-obrazovanie>
3. Snegurova, V. (2010). Distance Learning Mathematics for Secondary School Students. *Electronic Scientific Publication (Scientific and Pedagogical Internet Journal)*. URL: <http://www.emissia.org/offline/2010/1442.htm>
4. Timofeeva, O. (2011). Monitoring the Quality of Student Learning and Professional Competence of Teachers Trough the Distance Learning System in the Context of the Federal State Educational Standard. *Municipal Education: Innovation and Experiment*, №4, 16-19. URL: <https://cyberleninka.ru/article/n/monitoring-kachestva-obucheniya-uchaschihsya-i-professionalnoy-kompetentnosti-pedagogov-cherez-sistemu-distantsionnogo-obucheniya-v/viewer>
5. Studying Online: a Choice: How Quarantine Will Change School Education. (2020). URL: <https://59.ru/text/education/69108400/>
6. Why Is It Profitable to Enroll in a Foreign University During a Pandemic. (2020). URL: <https://www.gazeta.uz/ru/2020/05/20/study/>

## ПРОБЛЕМИ ТА СКЛАДНОЩІ ОНЛАЙН НАВЧАННЯ ДИСЦИПЛІН ЕКОНОМІЧНОГО ТА МАТЕМАТИЧНОГО ЦИКЛІВ

**Еліна Железнякова**

кандидат фізико-математичних наук, доцент кафедри  
вищої математики та економіко-математичних методів

Харківський національний економічний університет імені Семена Кузнеця  
ORCID ID 0000-0001-6409-4761  
*Zheleznizkova@m.hneu.ua*

**Тетяна Сілічова.**

кандидат педагогічних наук, доцент кафедри  
вищої математики та економіко-математичних методів  
Харківський національний економічний університет імені Семена Кузнеця  
ORCID ID 0000-0001-5003-2711  
*tas.20.05.72@gmail.com*

**Анотація.** У статті є висвітленими основні питання та проблеми, що є пов'язаними із переходом на online навчання. Визначена різниця між дистанційним навчанням у системі традиційної освіти на навчанням online. Наведені дані світових статистичних досліджень у цьому напрямку, визначені та структуровані проблеми, що виникають у рамках системи вищої освіти при переході на повне навчання online.

У статті є показаним, що такий вид навчання є достатньо новим напрямком, та при застосуванні котрого ряд університетів може спіткнутися із багатьма труднощами різного характеру. Підкреслено, що основною проблемою при застосуванні такого виду навчання може бути і той факт, що кардинально може змінитися і сама структура конкурентності вищих навчальних закладів. На прикладі викладання дисципліни «Теорія ймовірностей та математична статистика» окремо розкриті основні складнощі викладання та контролю отриманих знань, можливі методи їх усунення.

**Ключові слова:** online навчання; дистанційне навчання; університет; економіко-математичні дисципліни; навчальний курс.

**СПИСОК ВИКОРИСТАНИХ ДЖЕРЕЛ**

1. How USA Higher Education is Surviving a Pandemic. (2020). URL: [unipage.net/ru/1867](http://unipage.net/ru/1867).
2. Kostenko, J., Sidorova, E., (2020). Visa-Free Traveling: How the Coronavirus Has Affected for Paid Education. URL: <https://iz.ru/1007753/iaroslava-kostenko-elena-sidorenko/bezvuzovyi-rezhim-kak-koronavirus-povliial-na-platnoe-obrazovanie>
3. Snegurova, V. (2010). Distance Learning Mathematics for Secondary School Students. *Electronic Scientific Publication (Scientific and Pedagogical Internet Journal)*. URL: <http://www.emissia.org/offline/2010/1442.htm>
4. Timofeeva, O. (2011). Monitoring the Quality of Student Learning and Professional Competence of Teachers Trough the Distance Learning System in the Context of the Federal State Educational Standard. *Municipal Education: Innovation and Experiment*, №4, 16-19. URL: <https://cyberleninka.ru/article/n/monitoring-kachestva-obucheniya-uchaschihsya-i-professionalnoy-kompetentnosti-pedagogov-cherez-sistemu-distantsionnogo-obucheniya-v/viewer>
5. Studying Online: a Choice: How Quarantine Will Change School Education. (2020). URL: <https://59.ru/text/education/69108400/>
6. Why Is It Profitable to Enroll in a Foreign University During a Pandemic. (2020). URL: <https://www.gazeta.uz/ru/2020/05/20/study/>

Матеріали надійшли до редакції 18.02.2021 р.