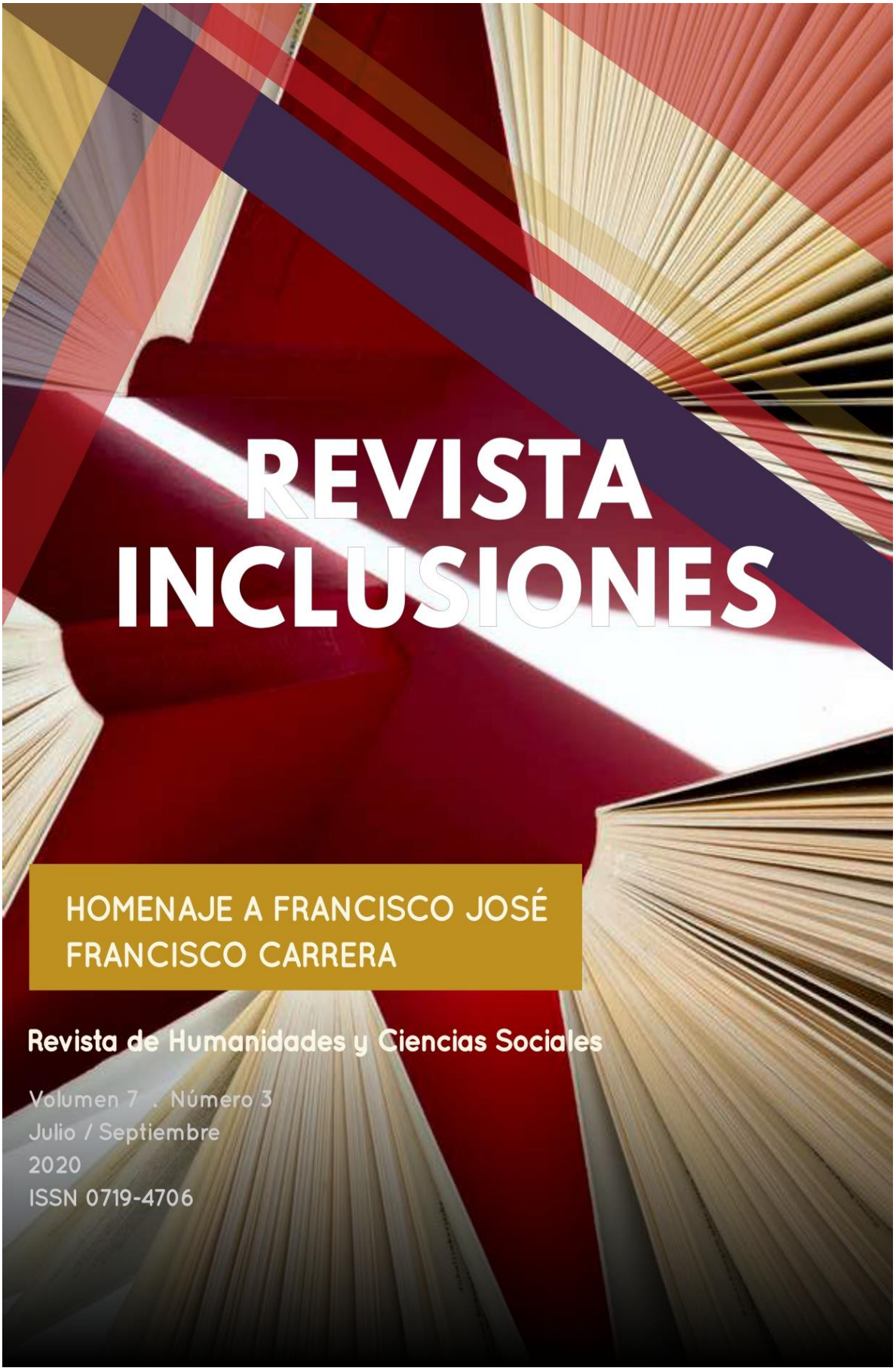
REVISTA
INCLUSIONES
HOMENAJE A FRANCISCO JOSÉ
FRANCISCO CARRERA
Revista de Humanidades y Ciencias Sociales
Volumen 7 . Número 3
Julio / Septiembre
2020
ISSN 0719-4706

REVISTA
INCLUSIONES
REVISTA DE HUMANIDADES
Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA
EDITORIAL

REVISTA INCLUSIONES
REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL

REVISTA INCLUSIONES

REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL

REVISTA
INCLUSIONES
REVISTA DE HUMANIDADES
Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA
EDITORIAL

Editorial Cuadernos de Sofía
Santiago – Chile
Representante Legal
Juan Guillermo Estay Sepúlveda Editorial

Indización, Repositorios y Bases de Datos Académicas

Revista Inclusiones, se encuentra indizada en:

BIBLIOTECA UNIVERSIDAD DE CONCEPCIÓN

REVISTA INCLUSIONES
REVISTA DE HUMANIDADES Y CIENCIAS SOCIALES

CUADERNOS DE SOFÍA EDITORIAL

ISSN 0719-4706 - Volumen 7 / Número 3 / Julio – Septiembre 2020 pp. 412-426

PROBLEMS OF DISTANCE LEARNING IN THE LMS MOODLE ENVIRONMENT THROUGH THE EYES OF STUDENTS OF MOSCOW AVIATION INSTITUTE DURING QUARANTINE (SELF-ISOLATION)

Ph. D. Peter A. Ukhov
Moscow Aviation Institute (National Research University), Rusia
https://orcid.org/0000-0002-3728-2262
ukhov@mai.ru
Lic. Anatoly V. Ryapukhin
Moscow Aviation Institute (National Research University), Rusia
https://orcid.org/0000-0002-2208-6875
ryapukhinav@mai.ru
Lic. Natalia A. Biriukova
Moscow Aviation Institute (National Research University), Rusia
https://orcid.org/0000-0002-6696-3104
natali_4_00@mail.ru
Lic. Anna K. Biryukova
Moscow Aviation Institute (National Research University), Rusia
https://orcid.org/0000-0002-4879-8686
nusy1296@yandex.ru
Lic. Boris A. Dmitrochenko
Moscow Aviation Institute (National Research University), Rusia
https://orcid.org/0000-0002-5579-5088
bonjour937@icloud.com

Fecha de Recepción: 19 de diciembre de 2019 – **Fecha Revisión**: 20 de enero de 2020

Fecha de Aceptación: 25 de mayo de 2020 – **Fecha de Publicación**: 01 de julio de 2020

Abstract

Information technology of the XXI century has influenced the work of universities around the world. Distance learning is not inferior to traditional forms of education at all, since students can also interact with teachers and classmates throughout the entire educational process. The Learning Management System (LMS) is currently a vital component of university e-learning infrastructure. Using LMS to create, manage and conduct educational and training programs allows educational institutions to create multimedia learning content that is comprehensive and practical. In connection with the coronavirus pandemic on March 17, 2020, Moscow Aviation Institute (National Research University) (MAI) completely switched to the distance learning mode, like other universities. When studying the Moodle training system, on the basis of which the educational system is built, there were problems to ensure the safety of students: from basic authentication to unintended information functions. When describing the problems of the LMS in the article, special attention is paid to the security problems of authentication and user identification. The article provides recommendations for resolving these problems.

Keywords

LMS Moodle – Distance learning – Coronavirus – Information security

Para Citar este Artículo:

Ukhov, Peter A.; Ryapukhin, Anatoly V.; Biriukova, Natalia A.; Biryukova, Anna K. y Dmitrochenko, Boris A. Problems of distance learning in the lms moodle environment through the eyes of students of Moscow Aviation Institute during quarantine (self-isolation). Revista Inclusiones num 3 (2020): 412-426.

Introduction

According to many students, distance learning is the most comfortable way to get education and skills, while such training is no less effective than, for example, internal study mode [1]. Digital technologies used to create the institute's website allow students to use the full range of modern innovative teaching aids[2]. In the process of mass implementation of distance learning, it is especially important to ensure the confidentiality and integrity of the data of students on the platform [3].

A significant problem of distance learning is the inability of students to organize their learning process. A number of students cannot correctly plan their studies during the semester. Starting to study several courses at the same time, students do not have time to complete tasks for all of them on time, because of which they have to refuse to continue and stop their study. This is evidenced by the data on mass open online courses, according to which only the percentage of students completing their studies with rare exceptions exceeds 10% [4]. Therefore, the role of the teacher or mentor, who will lead the learning process, encourage the study of the material and evaluate it, is extremely important. More significant actions on the part of teachers include also the following: communication management, evaluating the work of students, supporting their motivation and monitoring the learning process.

From the above-mentioned information, it can be concluded that the teacher, in order to organize effective distance learning and students to learn the material well, must test himself in the role of a student in a practical e-learning course and be fluent in the technologies used there.

Another important problem of distance learning is the problem of confirming the identity of the user when checking knowledge. This problem makes it impossible to objectively assess them, because during the test or exam, third parties next to the student can help him. This problem can be solved by installing video surveillance equipment near the student; this method will allow to be identified without unnecessary difficulties. Nevertheless, there are technical tools that can replace the identity in online mode: there is a set of neural network technologies, collectively called "deepfake". These problems require a separate study and special methods of identification.

---

[1], L. L. Khoroshro; P. A. Ukhov and P. P. Keyno, P. P. "Development of a laboratory workshop for open online courses based on 3D computer graphics and multimedia", International Journal of Engineering Pedagogy, Vol: 8 num 2 (2018): 64-71

[2] L. L. Khoroshko; P. A. Ukhov and A. L. Khoroshko, "The Use of Software to Create E-Learning Courses on Technical Subjects at University". The 20th International Conference Interactiv Collaborativ Learning 2017 and the 46th International Conference Engineering Pedagogy 2017, Bucharest, Hungary. (2017).

[3] L. L. Khoroshko; P. A. Ukhov and A. L. Khoroshko, "Application of the CAD/CAE systems for development of electronic training courses for the engineering disciplines in a research and development university", Global Engineering Education Conference, Greece, Athens. (2017): 96-100.

[4] H. Khaliland y M. Ebner, "MOOCs Completion Rates and Possible Methods to Improve Retention - A Literature Review", Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications, (2014): 1236-1244.

Impact of worldwide isolation on distance learning

COVID-19 pandemic in 2019-2020 affected education systems around the world, leading to the massive closure of educational institutions. As of March 10, due to this closure in connection with the spread of COVID-19, one in five students in the world stopped attending his educational institution. Most Russian universities have switched to distance learning since March 16, 2020 [5].

Measures to prevent the spread of COVID-19 through non-drug interventions and preventive measures, such as social distance and self-isolation, have led to the widespread closure of universities in 61 countries [6].

MAI also was closed. By the order of the rector M.A. Pogosyan No. 112 on March,16. “On the organization of educational activities in the context of the spread of a new coronavirus infection in the territory of the Russian Federation” the educational process in full was carried out remotely.

To provide distance learning, MAI uses the LMS Moodle platform:

- It carries out analytics and tracking;
- it has a modern interface that can be configured using themes and settings (this allows adapting the website to the needs of the organization and students);
- it has thousands of free plugins that allow adding new functionalities that can “support” students, teachers and administrators [7].

Based on this platform, the website called LMS MAI was created with a huge number of courses, which are distributed in the areas of training and the departments that implement them (Figure 1).

After authorization in the system, the student has available courses with the same name of subjects that he studies in this semester (Figure 2). Further, the process of interaction with teachers and classmates, as well as the process of obtaining assignments and access to the materials of lectures and seminars, can be carried out for students [9] [8].

[5] Kommersant. Students face distance living. 2020. Retrieved at https://www.kommersant.ru/doc/4292688

[6] RG.ru. Ministry of Education recommended universities to organize distance learning. 2020. Retrieved at https://rg.ru/2020/03/15/minobrnauki-rekomendovalo-vuzam-organizovat-distancionnoe-obuchenie.html

[7] Uchu.pro. LMS Moodle. 2014. Retrieved at http://blog.uchu.pro/lms-moodle

[8] MAI.ru. MAI e-learning system (main website). 2020. Retrieved at https://lms.mai.ru

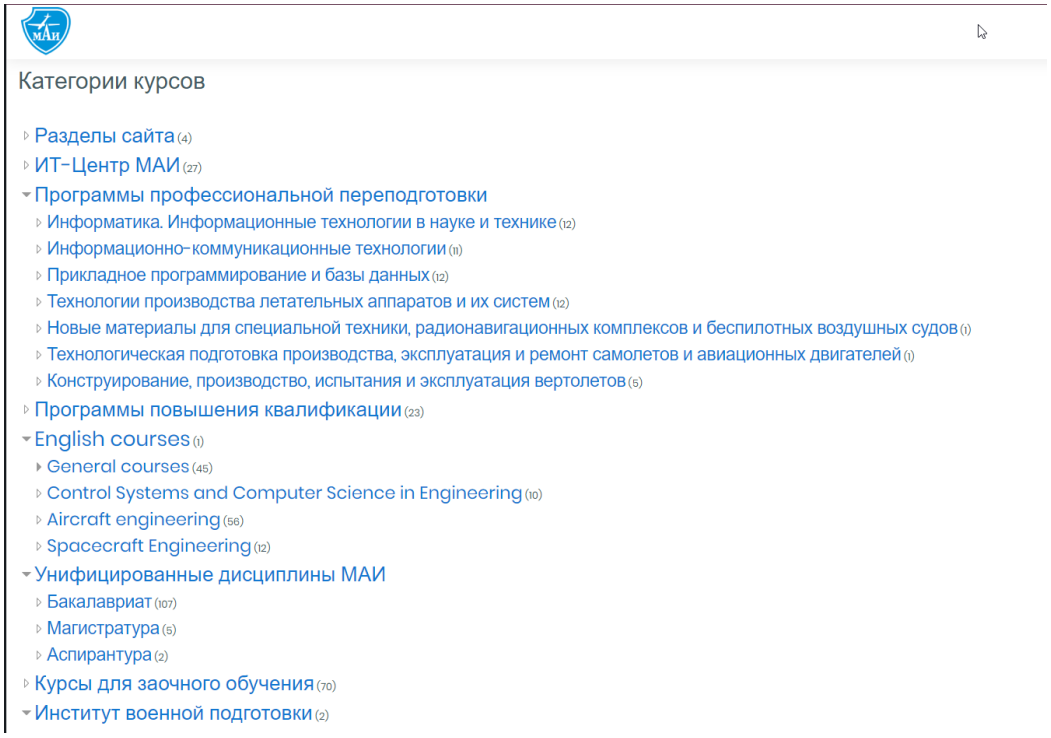

Figure 1
List of courses

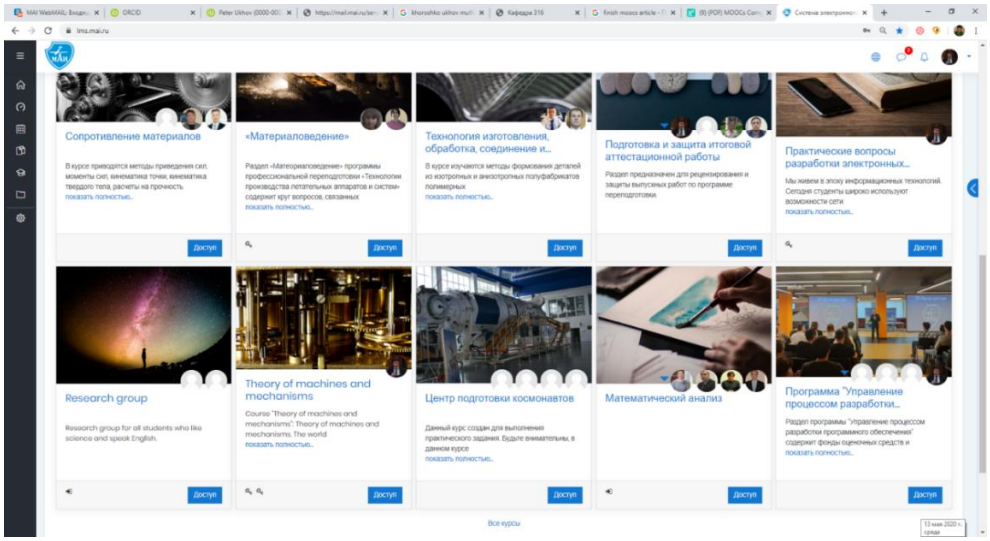

Figure 2
Student courses after authorization

Benefits of distance learning in MAI

Answering a question about the advantages of distance learning, almost all students and teachers agreed that flexibility is the main positive aspect of this form of education (Figure 3). The survey involved 100 students at MAI. They determine the pace of studying the material themselves, decide which tasks to return to, which sections to read several times. The intensity and duration of classes can also be adjusted independently, and this is also important.

One of the most interesting solutions in MAI was a video conferencing system built on a solution from a set of BigBlueButton servers and a load balancer. Since about 300 lessons can go at the same time, the power of one BigBlueButton server is no longer enough. Despite the fact that the developers guarantee that the solution will work for up to 1 500 students when setting up and testing under load, it turned out that already on 500 participants and 40 conference rooms (on average), there are problems with the authorization module.

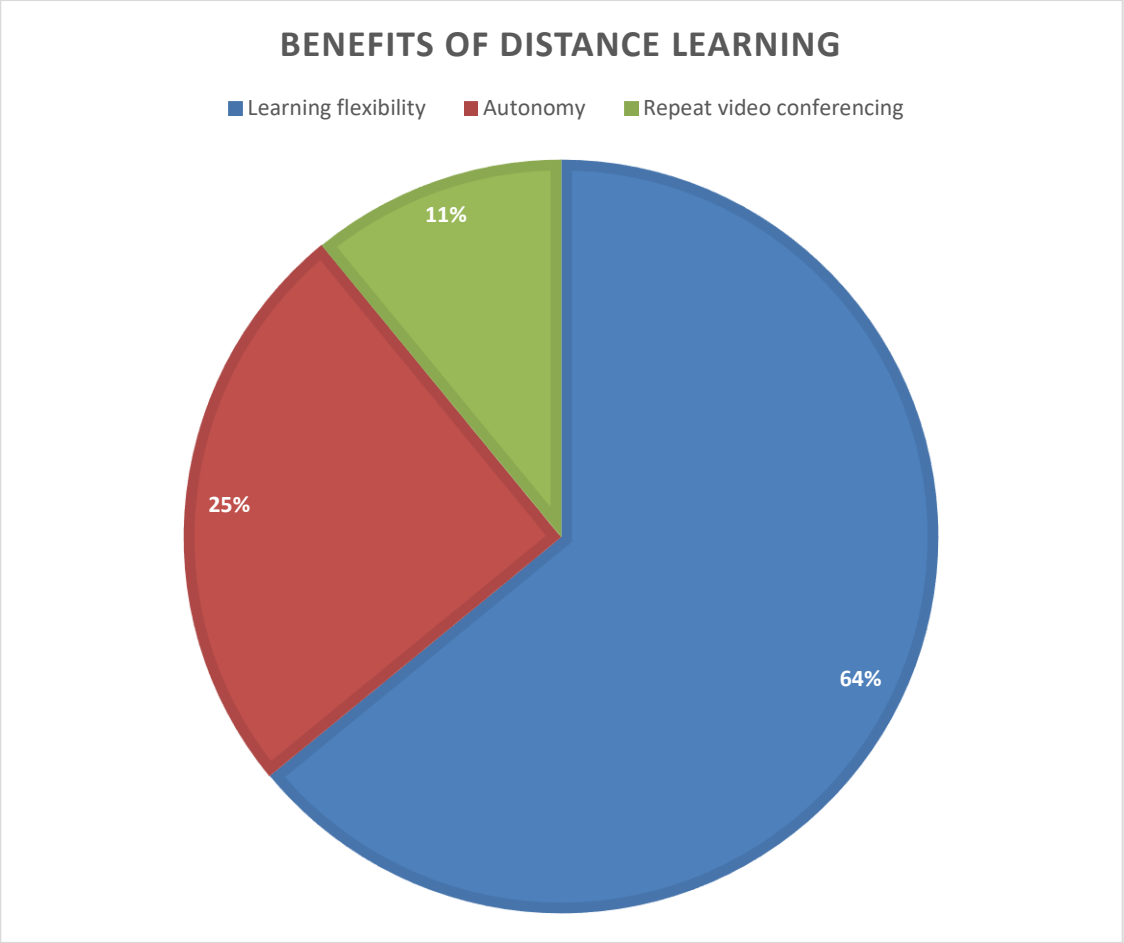

Figure 3
Student answers about the benefits of distance learning

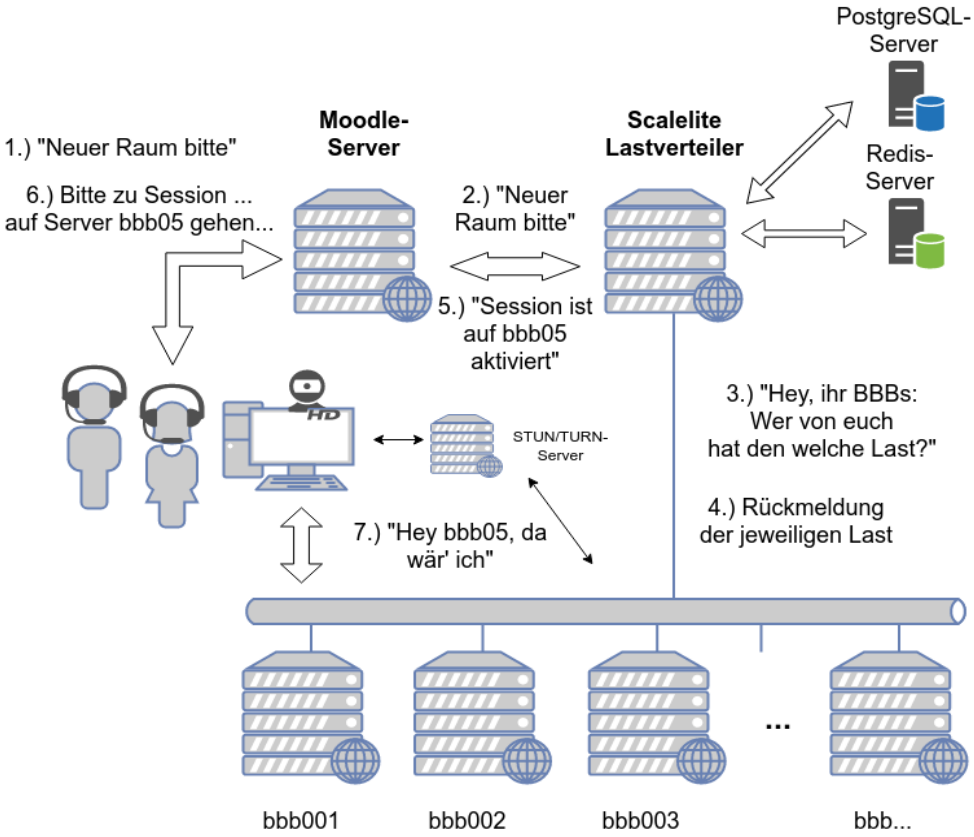

Figure 4
Architecture of distributed video conferencing servers BigBlueButton under LMS Moodle and Scalelite

This fact prevents the use of a single server on a high-performance cluster. The maximum configuration for solving 15Gb of memory and 14 CPUs and further increase in these parameters does not lead to increase in the performance of the solution. So, the architecture was implemented in MAI (Figure 4) based on the Scalelite balancer and the server pool scalable depending on the load. Despite a number of problems with the national coding in the Moodle modules, the solution turned out to be quite stable and scalable, which determined the mass use of online lectures for the preparation of recordings. The user-friendly lecture viewing interface was appreciated by students.

With the help of the e-learning system, which was created using LMS Moodle, students can study staying in absolutely any place. This is due to the fact that LMS Moodle platform is supported not only on computers, but also on mobile devices, the most important thing is Internet access[9]. To support the mobile application on students' smartphones, basic web - Moodle services and free application were used. In the case of using the latest versions of services, the application works stably, although there are problems with specific course formats, for example: course forum is not always correctly displayed in a mobile application. Nevertheless, the mobile application is convenient in that it does not require the student to log in constantly and saves passwords itself (security issues of the mobile application are not considered in this article).

[9] Moodle. Moodle LMS. 2020. Retrieved at https://moodle.com/lms/

Also, students and teachers of MAI noted as an important advantage of the distance learning system the ability to record and replay video conferences held earlier online. If a student did not have the opportunity to participate in this video conference or if he needs to re-listen to a certain point from this conference (lecture), he can easily play this recording again [10].

The advantages of distance learning include the ability to use various software tools (if students have the technical ability to install them). For example, SolidWorks tools are widely used for modeling three-dimensional objects (Figure 5), for working with microcontrollers we can use Tinkercad (Figure 6) and for programming we can use integrated by LTI gitlab systems and other external resources, the use of which offline would involve significant costs.

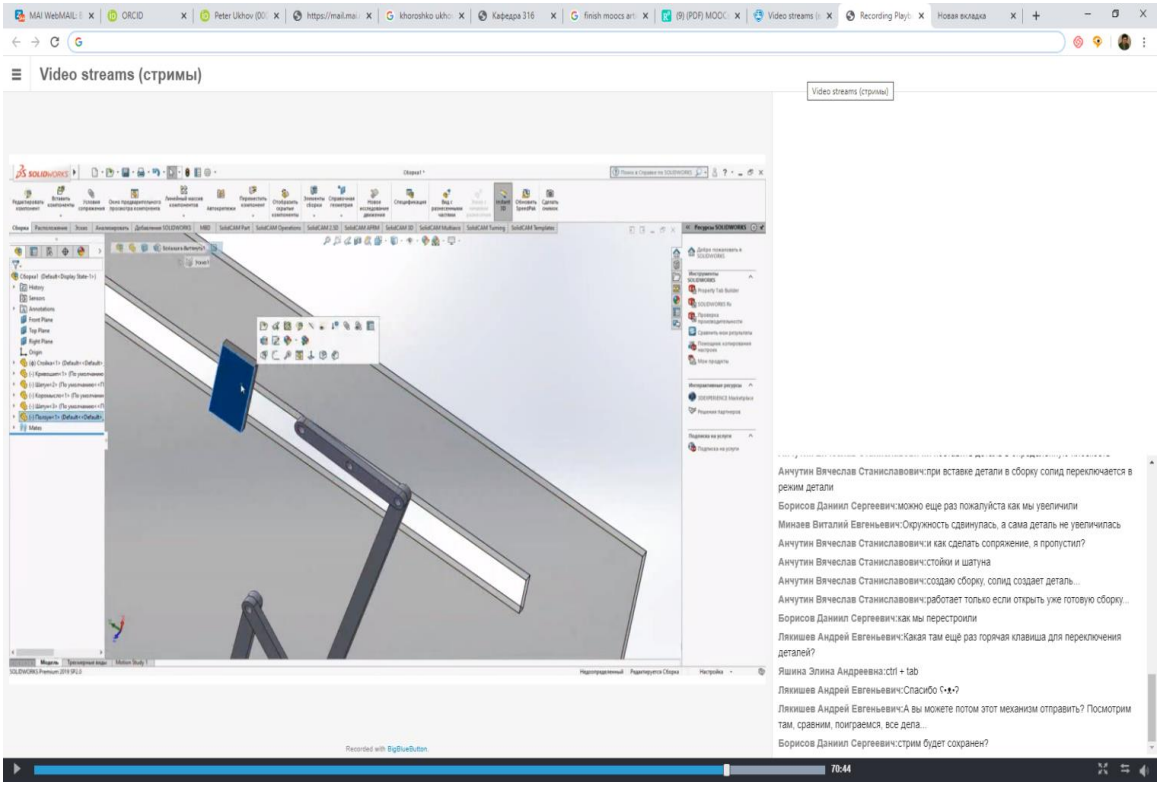

Figure 5
Laboratory work (one type of practical work or seminar) using SolidWorks

[10] MAI.ru. Distance learning at MAI: how it works. 2020. Retrieved at http://mai.ru/press/news/detail.php?ID=114512

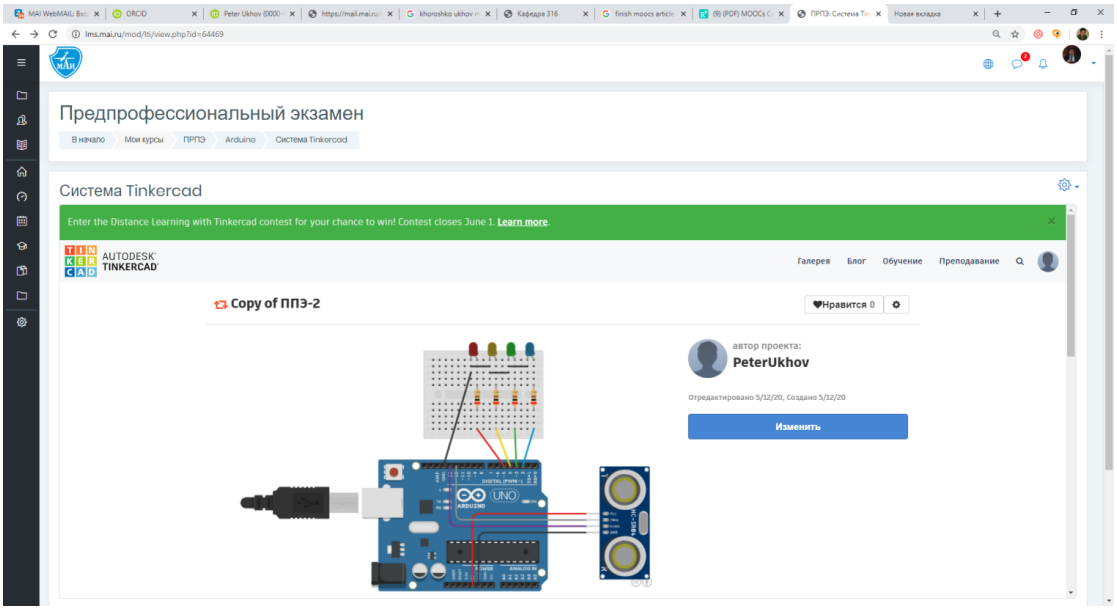

Figure 6
Working with Arduino at Tinkercad

In addition, the experience of implementing such humanitarian disciplines as, for example, foreign languages, as well as conducting thesis reviews online was interesting. However, deficiencies in the operation of the training system and security threats were identified. So, only in the first two weeks of mass online training, the accounts of more than 30 students were blocked due to hacking, measures were taken to protect against DDoS attacks, etc. Some of these issues will be discussed later.

Disadvantages of distance learning in MAI

Every situation has two sides. In addition to the positive aspects of the work of the distance learning system in MAI, students also identified several negative aspects and problems related to information security.

The most important problem was the password system, which initially (before the user's first authorization and password changes) was a four-digit sequence. Previously, combinations to ensure the safety of accounts were enough, because the activity on the site was much lower (Figure 7) than when the educational system switched to e-learning. Currently, the system is visited by about 10 000 students per day.

In addition, many representatives of the groups responsible for receiving each student's password do not put attention to the process of distributing account information: usually they send it to general communities and groups in social networks (Figure 8).

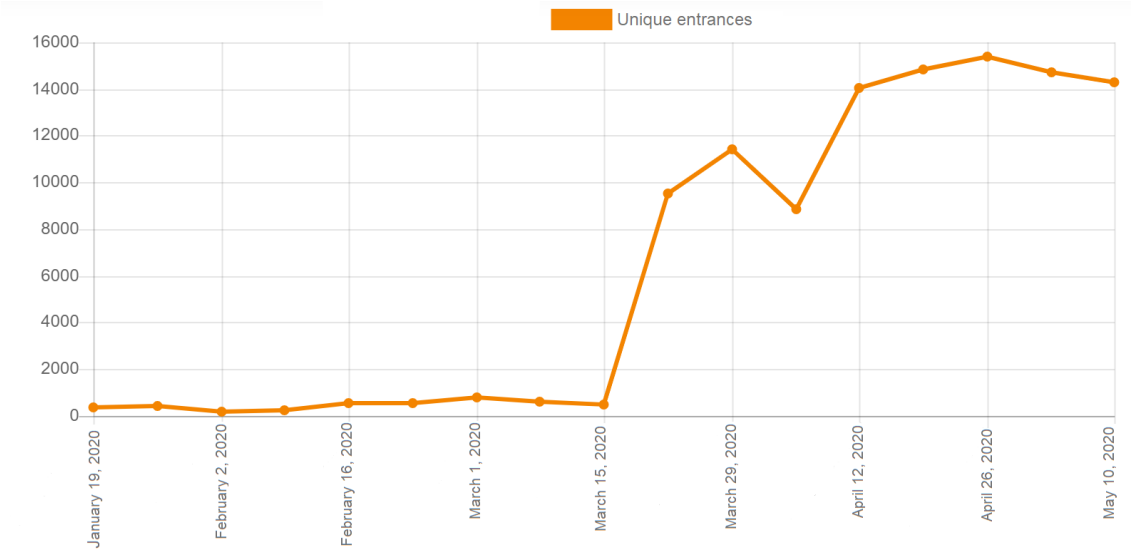

Figure 7
Growth in activity (authorization of unique users during coronavirus infection)

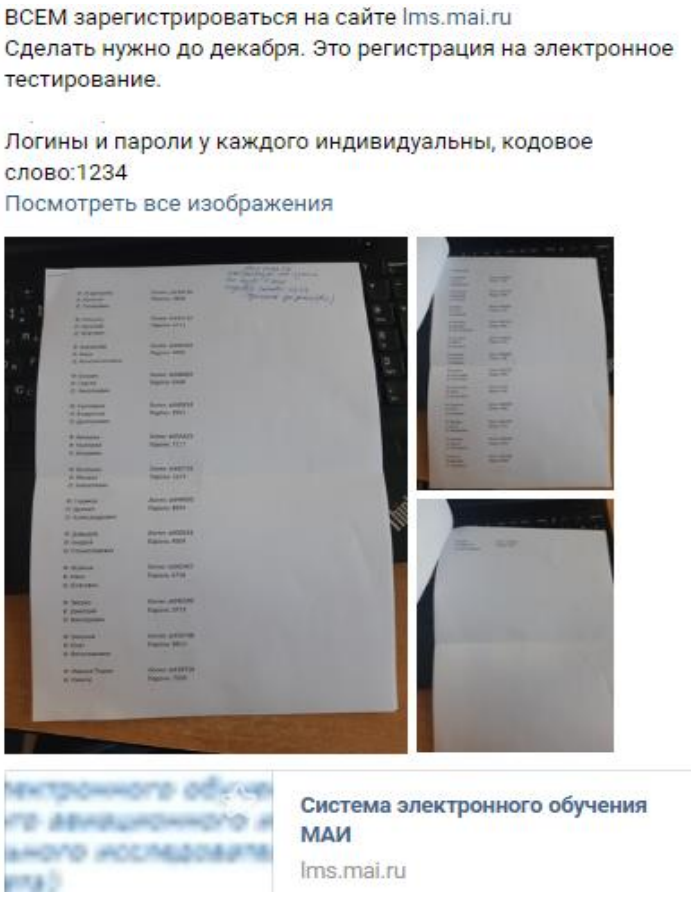

Figure 8
Post of one monitor of the group in the social network
(distribution of logins and passwords)

Thus, the information contained in these messages of the monitors of the groups and sent in this way, sooner or later goes beyond the chats. Including, it should be noted the shortcomings of closed groups in a number of social networks, for example, in VK (Russian social network). Closed groups can be viewed using various methods, and the contents of posts are indexed by search engines and may be accessible to cybercriminals. As a result of this, accounts become available at online lectures and unacceptable cases of misconduct arise. In MAI, more than 10 of such cases were identified, mainly related to the activity of already expelled students and 1 case of external invasion. Access to these accounts was quickly blocked.

For the purpose of the experiment, we conducted a “controlled” hack. First, we found all the passwords and tried to log in with one of them (Figure 9).

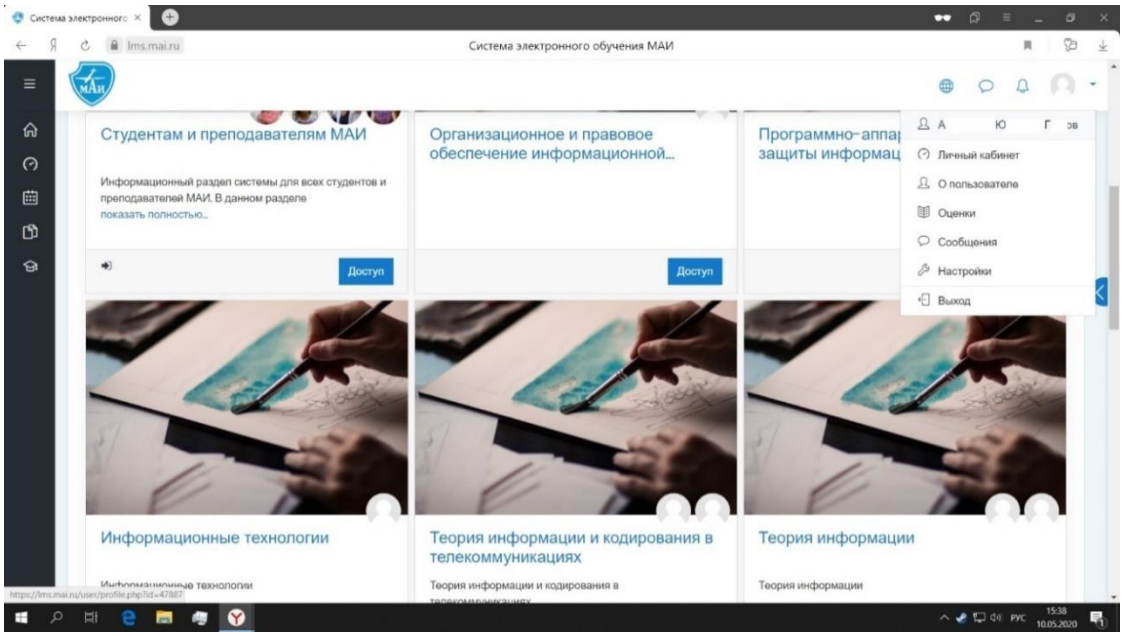

Figure 9
Successful login attempt

That is, possessing such information, an attacker could safely log into a forgotten account. In addition, students often do not change the passwords, but save them in the browser history or special services (Google or Yandex) for remembering passwords. We contacted the user and he changed the password. However, here we are faced with another problem: real user changed the password, while the attacker still remained in the system. This means that the site is not configured to revoke access keys, as, for example, Yandex or VK, which have user actions (changing the password, restoring access, ending all sessions), in which all his authorization keys are revoked, and the person is "thrown out" of the account. And the social network even has a separate topic that tells how to deactivate the access key [11]. Thus, in LMS MAI system, the option Exit after changing the password (password change log out) was turned on, which is disabled by default in the basic setting of the Moodle system [12].

[11] Yandex. Token recall. 2020. Retrieved at https://yandex.ru/dev/oauth/doc/dg/reference/token-invalidate-docpage/

[12] VK.com. How to deactivate a received passkey? 2020. Retrieved at https://vk.com/faq11694

In connection with the incidents, it is necessary to come up with new methods of protection and authorization of users. So how could this problem be solved? It would be possible to generate and give students longer and more difficult passwords, but then the process of creating and issuing them would take much more time and technical resources. Therefore, there are the following methods to avoid the problem:

- "temporary" passwords (that is, the student receives a password of a certain validity period, which must be replaced at the first login), the solution is presented below;
- issuance of data for entry into the distance learning system along with student passes (in a closed envelope, each student has the information for entry and a pass to the territory of the university);
- sending login data by e-mail (organize the collection of information about e-mail addresses of students upon their admission to the educational institution).

Now we consider a program that generates random logins and passwords (Figure 10). We have 20 different variations. Each line includes login, password and date of generation. Now let us imagine that the user who received the input data is trying to log in. If less than a month has passed since the generation, then the user will be prompted to enter a new password (Figure 11). If more, he will receive instructions to the e-mail specified during registration (Figure 12). If the user already changed the password, he will log into the system without problems regardless of the date (Figure 13) [13].

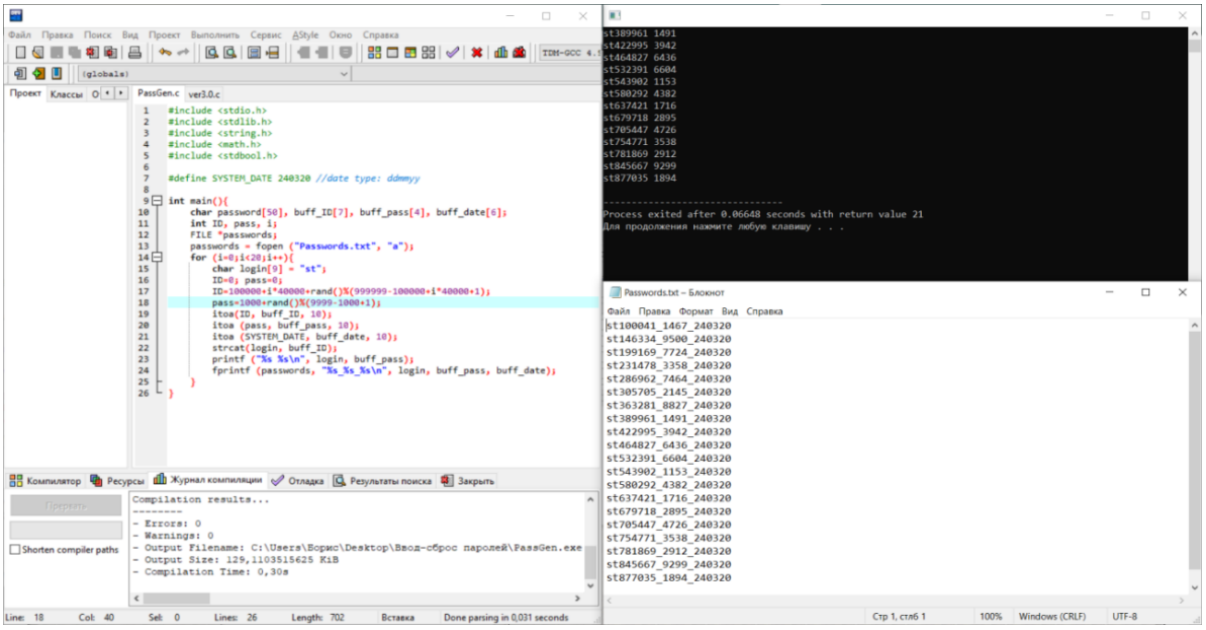

Figure 10
Generating passwords and logins

[13] RSDN.org. Help remove the line from the file. 2006. Retrieved at https://www.rsdn.org/forum/cpp/2200647.all

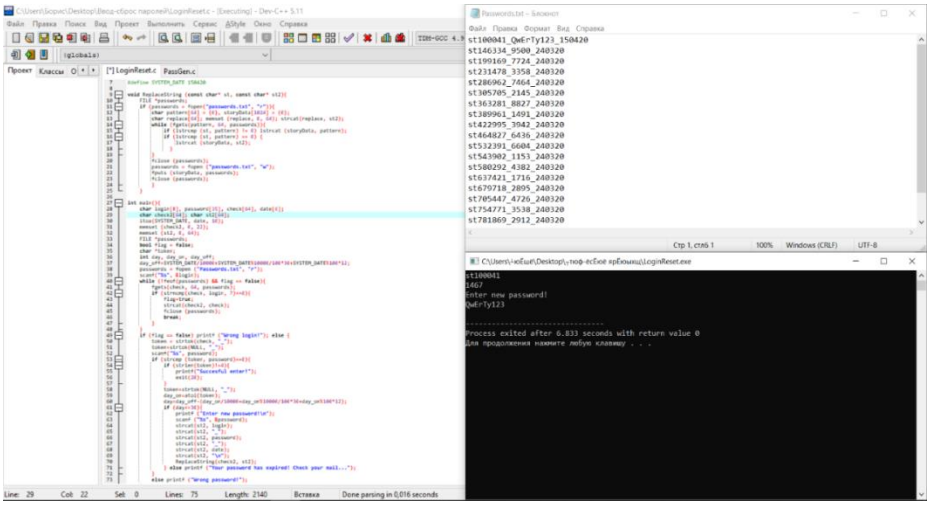

Figure 11
New password entry

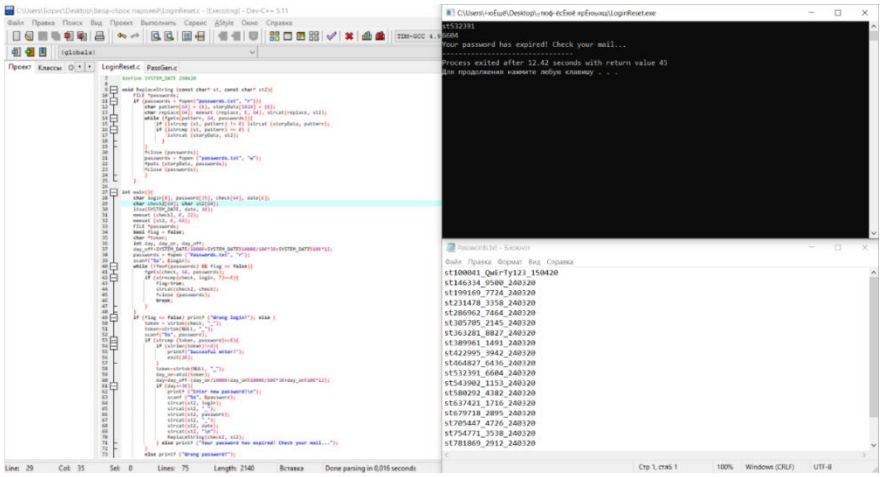

Figure 12
Instructions for specified e-mail address

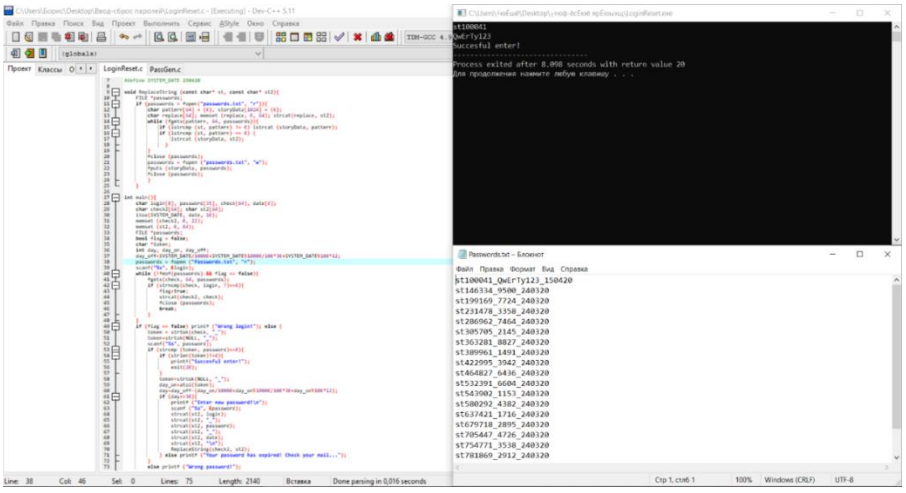

Figure 13
Login

There is another problem with the mailing list that was discovered by students. The work is not carried out quite correctly: by default, students who sign up for a course of a particular teacher will receive messages from their conversations with other students by mail. To deactivate it, the student has to independently explore the entire site in search of the necessary settings; it takes a lot of time. In addition, for some reason, the function of sorting and disabling the distribution are assigned to different sections. It would be much more convenient to put these two functions together. Also, by default, notifications about password and mail changes are turned off in this system. LMS MAI does not provide the function of informing about an attempt to unauthorized access to the account: if third parties try to access the account, the student will not be able to take the necessary measures to stop hacking attempts in a timely manner. Solutions to this problem may include the following: setting up mail notifications (to make it mandatory to send notifications about an attempt to change e-mail, directly about changing e-mail and password) ychange the names and hierarchy of sections of personal account by combining “Notification Settings” and “Notification Settings” into one common “Mail Notification and Message Settings”.

The third disadvantage is the problem of unauthorized system logins (unfortunately, at the moment this is not controlled in any way). However, this problem can also be solved with: - registration of new devices (information about new device and authorization code are sent to the phone number or mail, in other words, a kind of double authentication occurs, carried out only for the first time) y creation of an input log (on the site there is a tab that allows seeing the current sessions and IP from which they are carried out, but as soon as the user logs out, his address automatically disappears; however, you can easily request login information from support and even specify which accounts, besides yours, an attacker logged into from this address).

Conclusions

The findings of our study do not provide comprehensive answers to questions related to the organization of the process of improving e-education due to the fact that these problems are complex and multidimensional. But the distance learning system is a good, relevant and highly effective tool created thanks to the technologies of the XXI century. The use of this technology in conditions of worldwide isolation because of the pandemic is very important: students have an excellent opportunity to continue their studies, while interacting with teachers and other students. The tendency to use electronic educational portals by higher educational institutions provides the student with a huge number of advantages over the traditional form of training, for example, flexibility in learning material or autonomy of using the electronic portal. But distance technologies introduced into the educational process require more careful study in terms of student-teacher interaction and, of course, they require serious study in the field of information security. With the quality organization of distance learning, it becomes possible to provide quality education that will meet the requirements of modern society today and in the near future.

Bibliography

Khalil, H. and Ebner, M. “MOOCs Completion Rates and Possible Methods to Improve Retention - A Literature Review”. Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications, (2014): 1236-1244.

Khoroshko, L. L.; Ukhov, P. A. and Khoroshko A. L. “Application of the CAD/CAE systems for development of electronic training courses for the engineering disciplines in a research and development university”. Global Engineering Education Conference, Greece, Athens. (2017): 96-100.

Khoroshko, L. L.; Ukhov, P. A. and Khoroshko, A. L. “The Use of Software to Create E-Learning Courses on Technical Subjects at University”. The 20th International Conference Interactiv Collaborativ Learning 2017 and the 46th International Conference Engineering Pedagogy 2017, Bucharest, Hungary. (2017).

Khoroshro, L. L.; Ukhov, P. A. and Keyno, P. P. “Development of a laboratory workshop for open online courses based on 3D computer graphics and multimedia”. International Journal of Engineering Pedagogy, Vol: 8 num 2 (2018): 64-71.

Kommersant. Students face distance living. 2020. Retrieved at https://www.kommersant.ru/doc/4292688

MAI.ru. Distance learning at MAI: how it works. 2020. Retrieved at http://mai.ru/press/news/detail.php?ID=114512

MAI.ru. MAI e-learning system (main website). 2020. Retrieved at https://lms.mai.ru

Moodle. Moodle LMS. 2020. Retrieved at https://moodle.com/lms/

RG.ru. Ministry of Education recommended universities to organize distance learning. 2020. Retrieved at https://rg.ru/2020/03/15/minobrnauki-rekomendovalo-vuzam-organizovat-distancionnoe-obuchenie.html

RSDN.org. Help remove the line from the file. 2006. Retrieved at https://www.rsdn.org/forum/cpp/2200647.all

Uchu.pro. LMS Moodle. 2014. Retrieved at http://blog.uchu.pro/lms-moodle

VK.com. How to deactivate a received passkey? 2020. Retrieved at https://vk.com/faq11694

Yandex. Token recall. 2020. Retrieved at https://yandex.ru/dev/oauth/doc/dg/reference/token-invalidate-docpage/

CUADERNOS DE SOFÍA
EDITORIAL