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Comparison of two platforms for distance learning students of Moscow Aviation Institute: Microsoft Teams and LMS Moodle

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ABSTRACT

Microsoft Teams platform is a kind of messenger created on the basis of Microsoft Skype for Business in 2017. It implements the concept of a collaborative workspace and allows group members to organize joint online meetings, hold audio and video conferences and connect additional Microsoft services. Microsoft Teams implements the possibility of individual interaction between the teacher and the student through audio and video calls. In relation to the pandemic of coronavirus infection, on March 17, 2020, MAI completely switched to the distance learning mode. For the organization of distance educational process, LMS MAI website, based on the Moodle platform, is mainly used, but the range of its capabilities is limited. In order to expand opportunities and share the flow of students using the website for e-learning, many classes with students began to be held at Microsoft Teams. It has an intuitive interface and meets all the requirements of confidentiality and security: encryption, multi-factor authentication and device management are used to protect information; necessary protection mechanisms against unauthorized access are implemented. When this platform was studied a number of its advantages were identified compared to LMS Moodle platform, also there were system vulnerabilities correlated with LMS and suggestions to eliminate them.

KEY WORDS: distance learning; information; comparative analysis; computer software; educational software.

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Comparación de dos plataformas para estudiantes de educación a distancia del Instituto de Aviación de Moscú: Microsoft Teams y LMS Moodle

RESUMEN

La plataforma Microsoft Teams es una especie de mensajería creada sobre la base de Microsoft Skype for Business en 2017. Implementa el concepto de un espacio de trabajo colaborativo y permite a los miembros del grupo organizar reuniones conjuntas en línea, realizar conferencias de audio y video y conectar servicios adicionales de Microsoft. Microsoft Teams implementa la posibilidad de interacción individual entre el profesor y el alumno a través de llamadas de audio y video. En relación con la pandemia de infección por Coronavirus, el 17 de marzo de 2020 MAI cambió completamente al modo de aprendizaje a distancia. Para la organización del proceso educativo a distancia, se utiliza principalmente LMS MAI, basado en la plataforma Moodle, pero el rango de sus capacidades es limitado. Con el fin de ampliar las oportunidades y compartir el flujo de estudiantes que utilizan la página web para el aprendizaje electrónico, se comenzaron a impartir muchas clases con estudiantes en Microsoft Teams. Tiene una interfaz intuitiva y cumple con todos los requisitos de confidencialidad y seguridad: se utilizan cifrado, autenticación multifactor y gestión de dispositivos para proteger la información; se implementan los mecanismos de protección necesarios contra el acceso no autorizado. Al estudiar esta plataforma se identificaron algunas de sus ventajas en comparación con la plataforma LMS Moodle, también hubo vulnerabilidades del sistema correlacionadas con LMS y sugerencias para eliminarlas.

PALABRAS CLAVE: aprendizaje a distancia; información; análisis comparativo; software informático; software educativo.

Introduction

Microsoft Teams is a corporate platform developed by Microsoft, it has the ability to combine chat, meetings, notes and attachments in the workspace, the product is a part of the Office 365 suite and distributed through a corporate subscription. It has integration with all company products and even with third-party applications (Nashilov, 2019; Chernaya, 2020).

This platform is an excellent option for conducting classes in the distance learning mode: it implements the concept of a workspace for collaboration and chatting, and it can also be used to hold meetings and exchange files and applications.

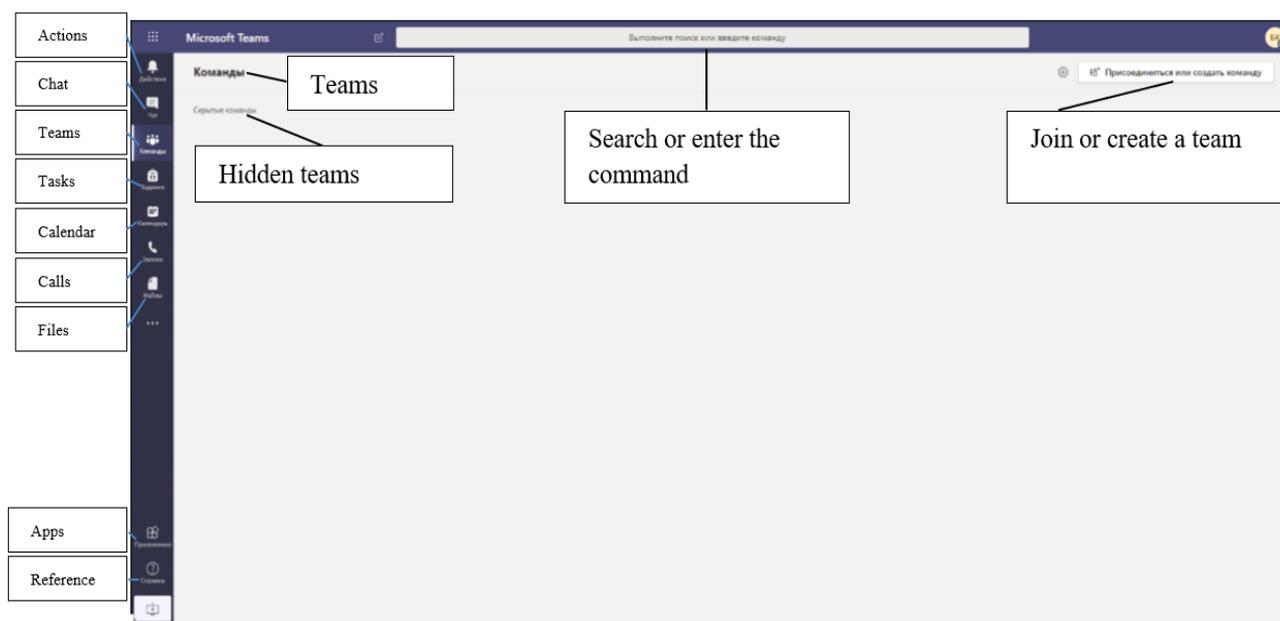
In addition to chats, Microsoft Teams has audio and video calls and document stores (figure 1) (Robotx.ru, 2020). These funds are divided into private (individual) and collective

ones. Students of MAI immediately assessed the possibility of a collective discussion of projects, reports and current training issues when using the platform.

As for conducting classes, it is worth noting the possibility of “visual” contact between teacher and students, which allows for control, for example, during tests or verification works. The platform allows holding meetings using a webcam, record all conferences, interact with a teacher not only during the conference, but also at any convenient time: it is a kind of messenger, so we can access any content of the working group: messages, document library, files or information about participants (Ukhov et al., 2018; Ukhov et al., 2020).

To register on Microsoft Teams platform, a student of MAI must go to the official website mai.ru, where he can receive corporate mail and password (Microsoft, 2017). The data for receiving login (mail) and password will be the name and telephone number. If the search in the students’ database was successful, the student will have the data to enter in Microsoft Teams, he will only have to log in (Microsoft, 2020a).

Figure 1. Platform work window



In order to start a conference, which will be an analogue of a seminar or lecture, we need to create a team and add participants to it (figure 2, 3). A team is users who are united by a common characteristic. It can be students who carry out one project, group of them, students and teacher, etc.

Figure 2. Creating a team

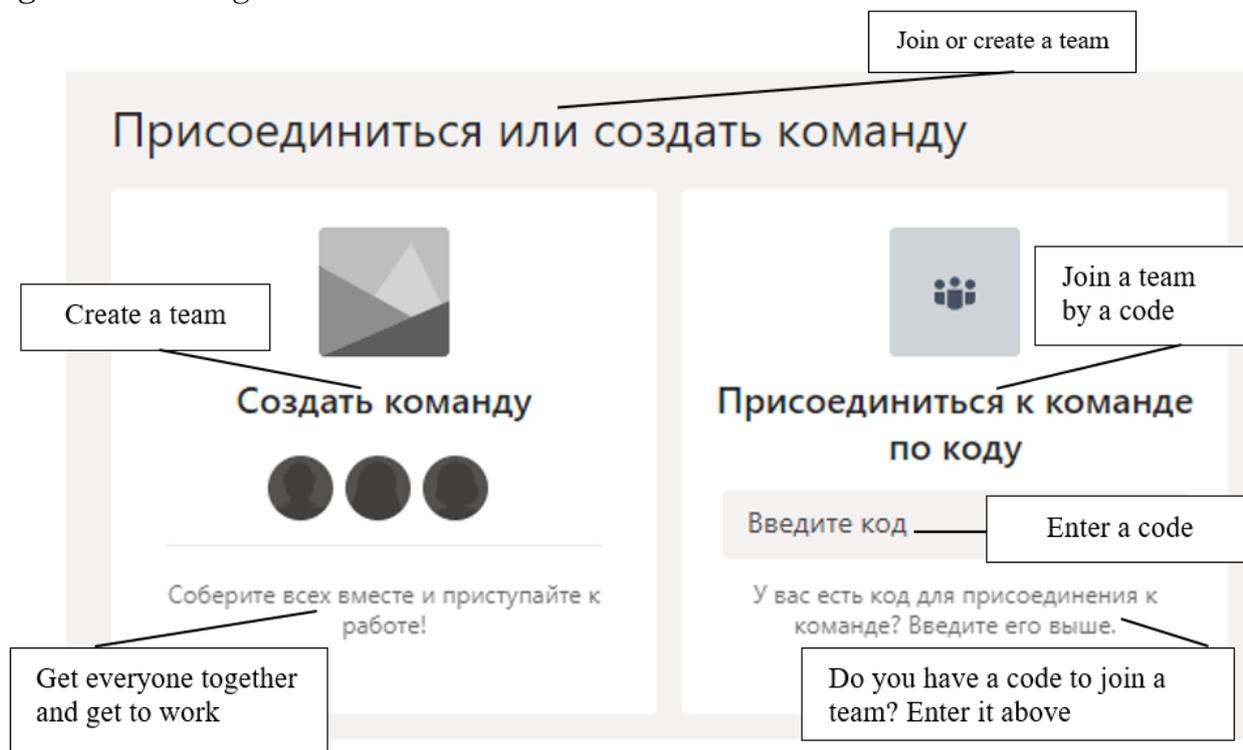
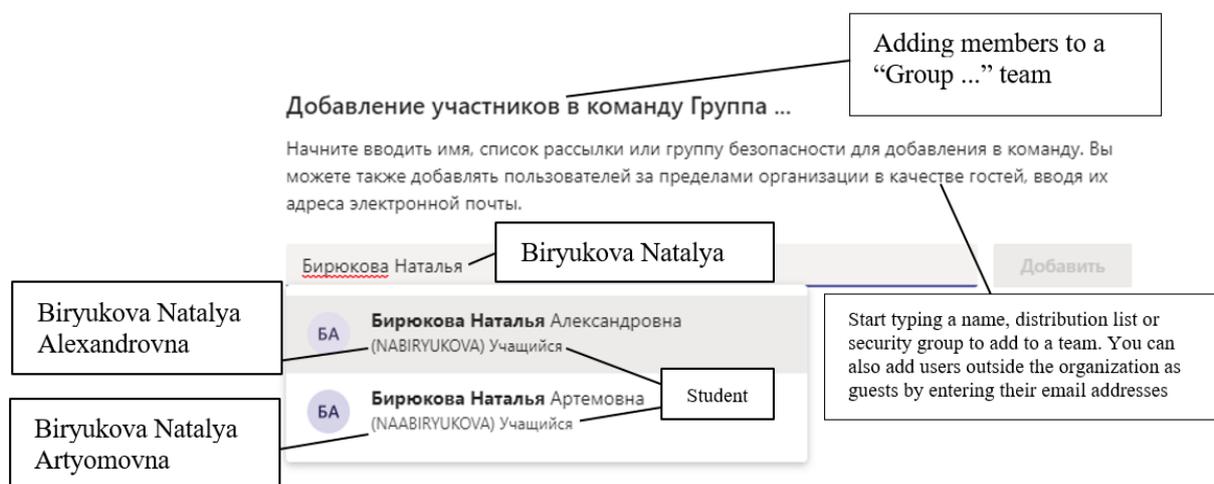


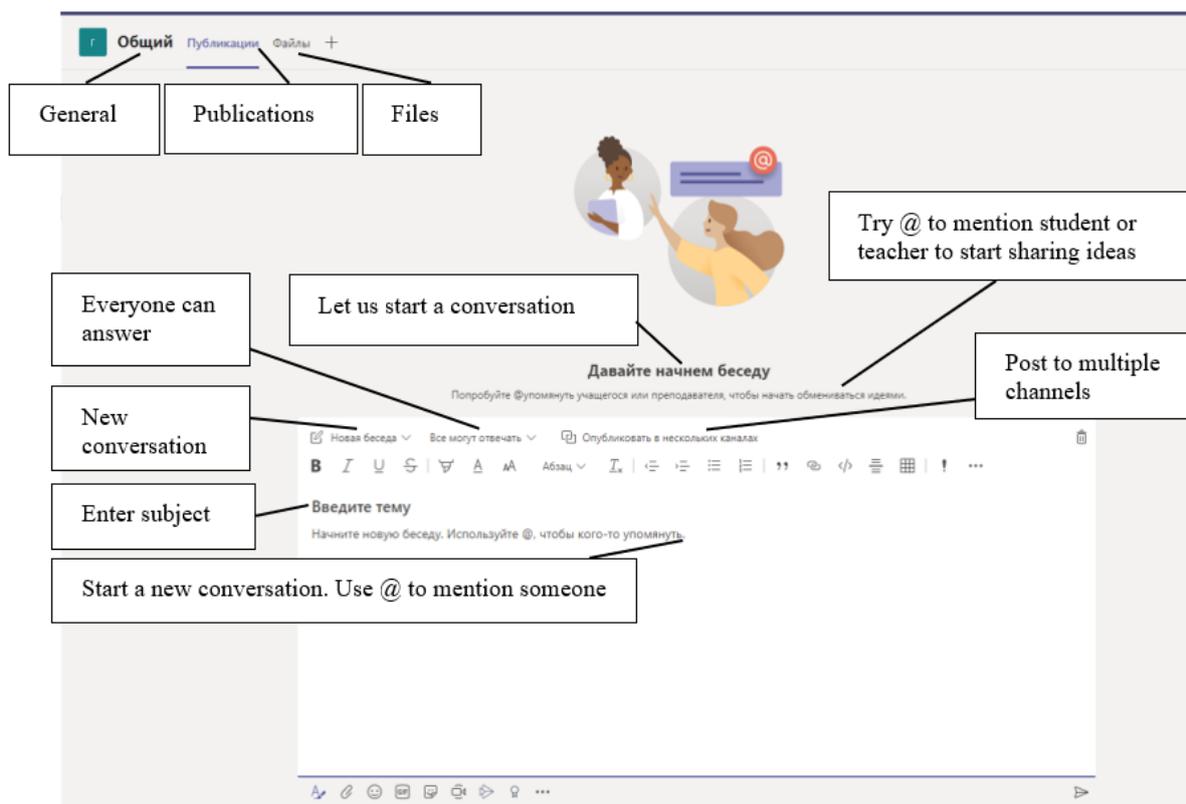
Figure 3. Adding members



After that, group members will have access to a general meeting chat with various options (figure 4):

- investments;
- stickers, emoji, GIF animation;
- “Start Meeting” button.

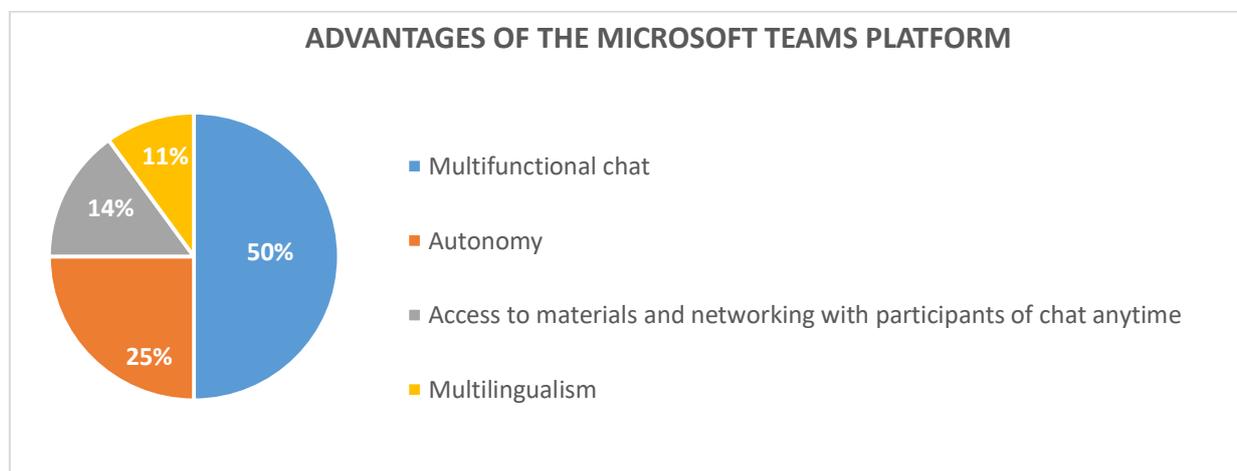
Figure 4. Team chat



1. Materials and Methods

As a result of a survey of a group of students of 100 people, it was revealed that Microsoft Teams is the second most popular platform for interacting with students (among the platforms used by teachers) (figure 5). During the survey, students also shared their views on the use of this platform, highlighting its advantages relative to LMS MAI.

Figure 5. Student survey results



2. Results and Discussion

In the article about a software product such as Teams, from the knowledge base of the Russian University of Chemical Technology, the authors indicated the following positive aspects for the software product:

- Creation of Team for organizing training in groups of students;
- Access to training materials and files;
- Assignment and verification of individual and group assignments, tracking their timely implementation and implementation of verification, and for students - an indication of the deadline for the delivery of work;
- Create virtual classrooms that enable students to make presentations or share a digital whiteboard. Teachers and students can interact using not only a whiteboard, but also text, audio or video;
- Organizing and conducting webinars, video lectures or practical online seminars that can be recorded for offline viewing (RCTU knowledge base, 2021).

In the article, we have also highlighted and shared these benefits of the platform so that educators and students can use the same experience in Teams to learn, collaborate and interact online.

Also the advantages of Microsoft Teams are:

- Multifunctional chat that allows exchanging files, carry out audio and video communication and format sent messages (figure 6) (Chernaya, 2020; Microsoft, 2020a). It should be emphasized that LMS MAI platform does not have such options (this platform only supports audio communication) (Ukhov, 2020);
- We can discuss ideas in a private chat and share them with the rest of the team. Microsoft Teams also allows storing all files and documents together, we can access them at any time, as well as view the content and history in the group chat or in a private chat (Chernaya, 2020; Microsoft, 2020a) (LMS MAI platform does not provide these capabilities: it does not have a closed chat; we can view the group's chat history only if a video conference was recorded before, etc.);
- Ability to communicate directly by mentioning and tagging team members. Microsoft Teams supports the addition of tabs on channels, which allow conveniently configuring the workspace for the needs of users, connecting not only Microsoft.GIF and stickers in

messages, but also various services and applications, including from third-party suppliers (Chernaya, 2020; Microsoft, 2020a);

- Microsoft Teams has smart features like background blur (LMS MAI does not have these features). Conferences in office365 allow attendees to connect to Microsoft Teams from any device (Nashilov, 2019). Note that there is a mobile version for this platform, while LMS MAI has only a mobile version (Ukhov, 2020). Interestingly, in Microsoft Teams, chat bots can act as chat participants, from which we can specify the necessary information and receive recommendations, which can greatly simplify the work and seriously increase the productivity of employees (if the functionality of such bots is developed) (ActiveCloud.by, 2020) (not supported by the platform LMS MAI);
- Multilingual Microsoft Teams: the interface of this platform supports most languages, for example, Russian, English, German, French, Italian, Spanish, Chinese (Microsoft, 2017; Microsoft, 2020a). (LMS MAI platform only supports 6 languages: Russian, English, German, French, Spanish, Chinese (Microsoft, 2020b)).

In addition to the positive aspects of Microsoft Teams platform, which is used for distance learning of students at MAI, there are some negative aspects related to information security.

Compared with LMS MAI platform, Microsoft Teams has solved the problem with a password system: receiving a password is not done by sending usernames and passwords to the monitors of the groups via social networks or in other ways, but by students themselves. To access Microsoft Teams, as well as other services of MAI information systems, we need to go to the website <https://mai.ru/getpass> and enter the student's personal data: in particular, full name, phone number and student status, and then select the method for obtaining a password (Microsoft, 2017). There are two options for obtaining it: automatic generation and setting your own password (figure 6).

In addition, the "registration" provides protection with the help of captcha from various bots, spam and attacks of automatic programs.

We consider automatic password generation (figure 7). This method is one of the most reliable and proven, since attacks from spam machines are excluded and direct contact with the student is obtained. Also, with this solution, we can implement not only a one-time confirmation of registration on the website, but also regular login to your account.

Figure 6. Password retrieval page interface

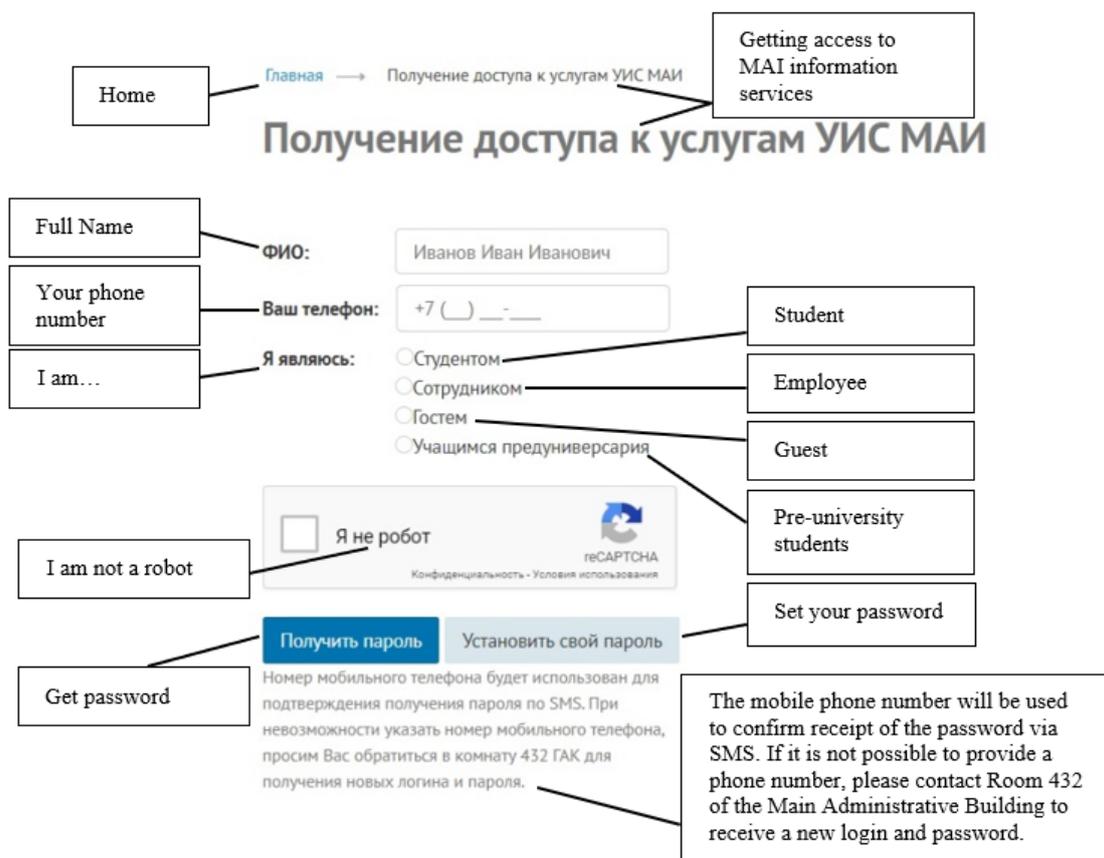


Figure 7. Receive verification code via SMS



After entering the six-digit code received in the SMS, a page opens with the login and password for access to MAI information systems, as well as to Microsoft Teams distance learning platform.

In the case of independent assignment of a password by the student, similar operations occur: the student fills out the proposed forms and enters the six-digit code received in SMS. After these actions, the student is asked to enter his own password, which is presented with the requirements inherent in strong passwords (figure 8). It is also important to note that there is a certain limit on changing the password, which also excludes the possibility of unauthorized editing.

Figure 8. User password setting

The image shows a web interface for setting a password. At the top, the title is "Получение доступа к услугам УИС МАИ" (Getting access to MAI information services). Below the title is a form with the label "Желаемый пароль:" (Desired password) and an empty input field. To the right of the input field is a box labeled "Desired password". Below the input field is a list of requirements for the password, each preceded by a red 'x' icon. The requirements are: "Содержать латинскую строчную букву" (Contain latin small letter), "Содержать латинскую заглавную букву" (Contain latin capital letter), "Содержать число" (Contain number), and "Быть не менее 8 символов" (Have at least 8 characters). To the right of these requirements is a box labeled "The password must meet the following requirements:". At the bottom of the form is a button labeled "Установить пароль" (Set password) and a box labeled "Set password".

Based on the above-mentioned information, we can conclude that when using the access system to information system it is impossible to prevent the sending of information with logins and passwords by the group leaders in LMS MAI (Agranovich, 2020).

Hacking this system is also practically impossible due to the fact that a sufficiently large number of time and computing resources are needed.

In case of changing the password by the user of MAI information system, the user logs out of the Microsoft account, and, accordingly, from Microsoft Teams (Microsoft, 2020b). This means that revocation of access keys is configured on this system. Comparing Microsoft Teams and LMS MAI platforms with this parameter, it is important to emphasize that LMS MAI did not previously have the ability to revoke keys (Agranovich, 2020), but today, this shortcoming of the main platform for distance learning of students of MAI has been fixed, and this option has become available to students.

In the article "Instrumental and methodological foundations of providing distance educational process with digital technologies (for example, Microsoft Teams)" from the journal "Pedagogy. Theoretical and Practical Issues" it was reported about such platform shortcomings as the impossibility of carrying out laboratory work on real equipment (Revunov et al., 2020). We agreed with this statement by conducting additional research on the platform's functionality. But we would like to note that it is possible to share the platform with other products from Microsoft and other manufacturers. Naturally, speaking of using one platform, we still cannot call Teams universal, but combining it with other products can solve any set tasks.

In addition, in the process of using Microsoft Teams platform, several shortcomings were identified, the solutions to which are presented below.

It is necessary to make new methods of authorization and user protection. A possible solution to security problems would be the generation of complex passwords by users, for example, with an increased length (more than 16 characters). In addition, another option may be the method of introducing "combustible" passwords, that is, the user receives a temporary password for a one-time login to the system (Ukhov et al., 2021a; Ukhov et al., 2021b).

LMS MAI platform does not provide the function of informing about an attempt of unauthorized access to the account (Man'zhov et al., 2017): if third parties try to access the student's account, the student will not be able to take the necessary measures to stop hacking attempts (Moscow Aviation Institute, 2020). Microsoft Teams platform has the ability to notify the user of all logins to the distance learning system. Also, Microsoft Teams is configured to send email notifications about an attempt to change email, directly about changing email and password change, which is not in LMS MAI.

Another drawback of the system is the problem of extraneous inputs, which was also observed on LMS MAI. This situation occurs due to the theft of information and data about the usernames and passwords of students by other users for the sake of jokes or by intruders. There are three ways to solve this problem:

- registration of new devices in the system (information about a new device and an authorization code are sent to a mobile or mail);
- creation of a log of entrances;
- blocking users from whose accounts third-party logins are made until the user password is changed to more complex ones.

In addition, independent experts discovered Remote Code Execution, a vulnerability that could allow arbitrary code to be executed through Microsoft Teams platform. This platform, unlike LMS MAI, uses the Squirrel utility, which provides the download and installation of updates created using the NuGet package manager. Experts found that the “update [URL]” and “download [URL]” commands allow uploading a file to Microsoft Teams folder, where it will be automatically executed (Moscow Aviation Institute, 2020). Possible recommendations for counteracting code execution through Microsoft Teams are the following:

- user should not be able to disable antivirus software;
- method for automatically updating anti-virus signatures should be implemented;
- anti-virus software used should provide protection against boot viruses;
- virus removal process must be planned in advance.

Conclusion

The trend of universities to use electronic platforms for distance learning provides students with autonomous and flexible learning. Thanks to this, in the current situation, the educational process was not stopped or disturbed, but was even supplemented by such advantages as flexibility and autonomy in obtaining knowledge.

Microsoft Teams platform, which is widely used for organizing video and audio conferences by various organizations and higher educational institutions, contributes to the process of obtaining knowledge. Good password system, ability to format sent messages, access to send materials at any time and wide choice of interface language make this platform

one of the most frequently used platforms not only at MAI, but also around the world. With the quality organization of distance learning at Microsoft Teams, including in terms of information security, it becomes possible to provide quality education.

From comparisons between Microsoft Teams platform and LMS MAI, we can conclude that Microsoft Teams platform as a whole is more optimized and protected from attacks than LMS MAI. However, Microsoft Teams also has some vulnerabilities and methods for fixing proposed here.

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