

Teaching Approach in Difficult Knowledge Transfer Conditions Due to the Pandemic State of Emergency

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Abstract - This paper represents a teaching approach to the transformation of classical lectures teaching. Paper elaborates use of the online platform that enables students with and without disabilities to follow classes without hindrance during the lecture period. The main advantage of this kind of teaching is the possibility of attending classes from any location and from any device, it is only important to be connected to the Internet connection. After the lecture, students also have the ability to view video and presentation materials.

This paper describes a new approach to teaching and illustrates the expected benefits of online teaching. Full integration with the already existing Faculty Information System has been performed. The platforms used in this integration are Microsoft Azure, Microsoft Office 365 Admin, Microsoft Teams, Microsoft Stream and Microsoft SharePoint.

Keywords: education, on-line learning, teaching analysis, Microsoft Teams, Microsoft Azure

1. INTRODUCTION

Starting from March 2020, almost all spheres of business were forced to the online way of doing business. The new health crisis has demanded that more and more organizations use telecommunicating to preserve and respect social spatial distance. Therefore, the conditions created by the Covid-19 pandemic state of emergency provide opportunity for intensive research into teleworking. All for the purpose of adapting to this way of everyday work as well as maintaining the current global economy. This way of working leads to the flexibility of employees in various types of business and provides a completely new way of functioning for the end users of the system. Adapting to these circumstances has increased productivity, reduced the costs of employers and employee fatigue due to daily commuting. Certainly, the biggest issue in terms of nowadays business is reflected in the adaptation to new technologies as well as raising awareness of the necessary computer knowledge of the end users of the system.

This paper describes all parts of the system that are analyzed for the purpose of teaching at university academic studies. Also, the implementation process as well as the student and professor approach to the platform will be described.

Compared to traditional classes, online classes offer myriad benefits for students. Certainly, the two biggest advantages of online teaching are the re-viewing of recorded materials as well as a login to the platform from any location and any device that has Internet access.

2. STATE OF ART

There are various software solutions for online video calls on the market. This part of the area gained its greatest popularity with the appearance of the Covid-19 global pandemic. Software's such as Microsoft Teams, Zoom, Google Meet, Cisco Webex and many others have diverted much of their revenue to developing additional plug-ins and upgrades to their existing software solution. In this way, each company tries to position itself as a market leader and maintain its popularity with end users.

Among the large number of online video chat platforms, the Microsoft Teams platform stands out the most. In addition to the use of video calls, the platform offers the possibility of using chat messages, video recording of meetings as well as creating tests directly within the platform itself.

Tsai predicts that by the end of 2021, Microsoft Teams will be in use in more than 41% of companies worldwide. [1] The current situation is such that the Microsoft Teams platform is used daily by more than 75 million active users. Statistically speaking, in July 2019, the Microsoft Teams platform had 62 million active users. Based on these data, we conclude that the number of users of this platform has grown rapidly with the appearance of the Covid-19 pandemic.

Microsoft Teams offers the ability to integrate with existing solutions. In this way, educational institutions are given the opportunity to synchronize Moodle courses, grades, and assignments. By synchronizing these two platforms, we create a unity in which all modules are located on one platform. [2] The integration of the Moodle platform and the Microsoft Teams platform is also possible with the help of installing additional plug-in software directly on Microsoft Teams. This way of integration does not require additional computer knowledge by platform users. In this way, all materials from the Moodle platform are visible on the Microsoft Teams platform.

In addition to the listed software, Learning Management Systems (LMS) are also very often used in practice. This type of software offers the instructor to deliver content, monitor students, and evaluate the performance of students. LMS systems provide the possibility of threaded discussions, video conferencing and discussion forums. The primary use of such systems is knowledge management (KM). This kind of management team refers to the exchange and analysis of knowledge as a resource. The dependence of the LMS system is directly influenced by the strategy and goal of the organization. Very popular

LMS systems are Moodle, Blackboard Leand and Schoology.

Starting from the assumption that the realization of teaching depends on the educational system and the way of knowledge transfer, we can conclude that the introduction of online teaching has badly affected the quality of teaching of educational institutions that are not used to this kind of work. Daisy with his expert team believes that the online way of knowledge transfer has caused a lot of damage to medical educational institutions in many ways. The greatest negative impact is visible in the field of practical knowledge and practical exercises. The problem that arises is that practical classes cannot be held in specialized laboratories. Another negative impact is that practical work in a real environment in the form of going to the hospital is not possible because numerous hospitals have become Covid-19 hospitals and for that reason students do not have access to them. [3] However, despite the challenges posed by the pandemic in providing health care, this type of virtual learning represents acceptable results of knowledge transfer. This way of knowledge transfer opens the possibility of expanding virtual teaching in all types of education around the world.

3. PROJECT DESCRIPTION

It is important to note that full integration with the already existing Faculty Information System has been performed. It would be good if after enrollment the student gets access to his Microsoft Office 365 account to the platform itself using the same access. Students have Microsoft Office 365 calendars in which the teaching dates in the current year are predefined, which are created by professors and assistants before the beginning of the semester. It is recommended that all students are able to follow the optional courses and that the system is fully open to guests of the system (guest access feature). In addition to classes, consultations are expected to be held through the Microsoft Teams platform.

Each team within the Microsoft Teams platform represents one subject. Each student has insight only into the teams (subjects) he/she is following in the current year. After passing the exam in the subject, the student is excluded from it. Realized lectures and exercises at the university are recorded in their entirety and are all visible to students after lectures and exercises. Students view videos using the Microsoft Stream platform.

For the needs of the analysis, the platform was implemented at several physical locations in Belgrade, Novi Sad and Nis. Before the introduction of the state of emergency in the country, the university realized classes in the classical way with the use of amphitheatres and electronic classrooms. Each of these lectures involved the physical arrival of the student at the university as well as the use of technical equipment by the lecturers and students (computers, monitors, projectors, etc.). After the implementation of the Microsoft Teams platform, university has drastically reduced the cost of technical equipment, and was able to redirect funds in development of online materials and platforms. Conclusions presented

in this paper are based on the analysis performed on more than 6000 active students and over 300 lecturers. For the purposes of online learning, all students and all lecturers were included in different groups of the Faculty Information System and Microsoft Office 365 groups. The active winter semester of the 2020/2021 school year was used as a testing time period.

Students with previous computer knowledge and knowledge in the field of new technologies have created a very optimistic attitude towards the online way of knowledge transfer. Their performance and self-directed learning were directly affected by the use of e-platforms during the Covid-19 pandemic.

4. PROPOSED SOLUTION

In order for integration to be possible, in addition to all other external factors that can potentially affect the quality of video and audio material transmission, the most important item is certainly the Internet connection. In this case, the speed of the Internet connection of the lecturer and the listener is important. Based on the performed test, the obtained results are such that the largest number of listeners and lecturers is in the range of 60-80% of the quality of the Internet connection. The results of this test are shown in the Table 1 (*Table 1 – Services points*).

Service	Points(Min)	Points(Max)
Exchange Online	79	100
SharePoint Online	53	100
Microsoft Teams	72	100
Network assessment	68%	100%
Total points(not +)	204	300

Table 1 - Services points

We will primarily rely on the use of the Exchange Online service. Based on a test done on 6107 users the result shows that the average latency is 30ms. This number indicates that users have been able to use the application without interruption in the previous 30 days. SharePoint gives slightly worse results for a reason. The obtained result is the result of the use of Wi-Fi connection by the end users of the system and slightly worse quality of the upload / download stream. Compared to the SharePoint platform, the Microsoft Teams platform offers much better performance for end users. This is also evident in test results with end results such that UDP latency is 50ms, UDP jitter 27ms and UDP packet loss is 0.33%. [4] Based on the test, information was obtained that 31% of users who use the Microsoft Teams platform spend more than 10 hours each week in meetings / lectures. (*Table 1 - Services points*).

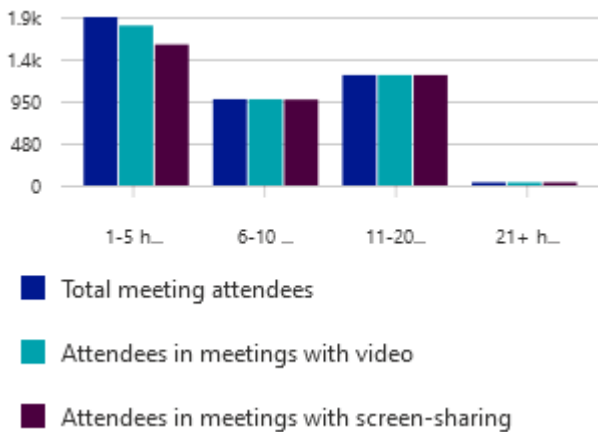


Illustration 1 - Amount of time per week

In addition to classic lectures and exercises, students use the 1-on-1 call option very often. The average obtained based on the test is such that 64% of conversations last more than 30 minutes. Considering this information, we gain insight into the fact that a large number of students use this option to develop projects in groups as well as mutual counseling (Illustration 1 – Amount of time per week).

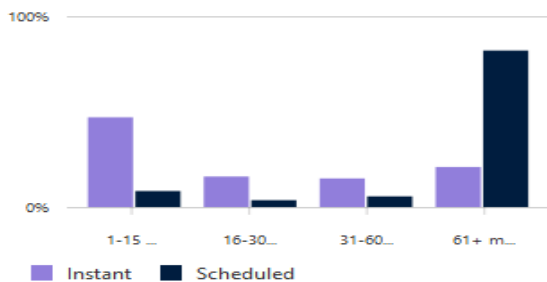


Illustration 2 - Amount of time per instant meet

The number of meetings organized on the Microsoft Teams platform in the previous 30 days is shown in Illustration 3 (Illustration 3 – Number of collaborations).

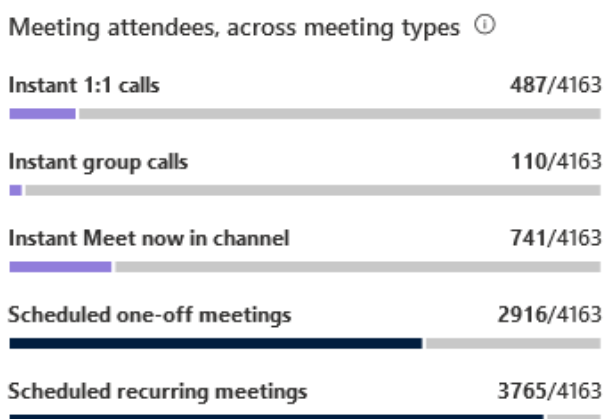


Illustration 3 - Number of collaborations

The use of the Microsoft Teams application in our organization has increased by 1368% since the university switched to online teaching. This is information obtained based on the use of the previous 90 days.

Access to video and presentation materials is possible through the Files and Video materials tabs on the Microsoft Teams platform. Each team / subject has an identical structure that contains the following elements:

- **Posts** – notifications sent to students as well as test results
- **Files** – page of items for storage of presentation materials
- **Class Notebook** – the ability to take notes by students and professors during and after lectures
- **Assignments** – tests created for the team / subject
- **Grades** – review of student grades
- **Video materials** – view student videos using the Microsoft Stream application

Looking at the log files of the Microsoft Teams platform, we can conclude that the platform has the largest number of users access via computers with the Windows operating system, although a large number of system users have the ability to access via mobile phone. The time range of the graphs is 30 days.

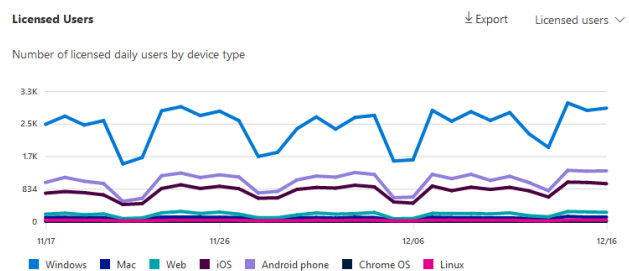


Illustration 4 - Number of used devices

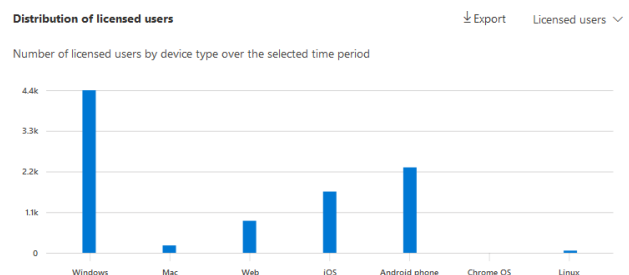


Illustration 5 - Number of used OS's

It is important to note that students are allowed access from almost all existing operating systems. [5]

5. OVERVIEW OF SYSTEM IMPROVEMENT ON ALREADY EXISTING INFRASTRUCTURE

When we look at the presence of students in online classes compared to traditional classes, we come to the fact that a larger number of students more regularly approached classes that are in the online format. Statistics showing student attendance over a 30-day time range are shown in Illustration 6 (Illustration 6 – Number of active users).



Illustration 6 - Number of active users

Based on the information from the system, we come to the conclusion that on average every day there were 3973 students who joined the Microsoft Teams platform. The interaction of students in relation to classical teaching is much greater. Statistics showing student interaction over a 30-day time range are shown in Illustration 7 (Illustration 7 – Students interaction).

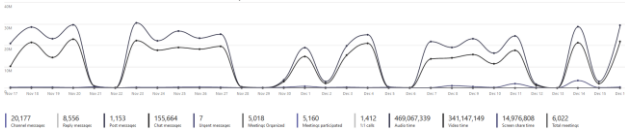


Illustration 7 - Students interaction

The implementation of such infrastructure has greatly reduced the physical attendance at the university. Based on a test done on active students accessing the Microsoft Teams platform, the result is that 81% of students do only the remote only type of approach while the other 19% are most often university professors, assistants, and administrative staff. [6] The physical presence of students since mid-October is shown in Illustration 8 (Illustration 8 - Remote only VS Onsite).

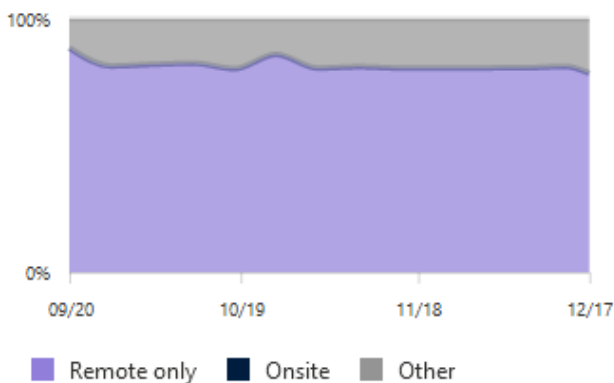


Illustration 8 - Remote only VS Onsite

6. RECOMMENDATIONS, DEVELOPMENT PLAN AND FUTURE STEPS

According to the current situation in the country and the world, the next step in the way of teaching is still unpredictable. For now, based on testing, it is considered that the next step will be the joint implementation of classical and online teaching. The combination of these two modes of knowledge transfer is called Blended learning. [7] This way of teaching offers the end listeners the possibility to choose the teaching format as they wish,

as well as the possibility to re-view the recorded video materials after the lecture. [8]

Blended learning has performed very well when covering large amounts of subjects with students who are independent of each other. This way of learning offers the student flexibility and the ability to control the pace of learning. In addition to this advantage, blended learning offers a more comprehensive understanding of subject content. Because blended learning enables interaction with students and instructors, social learning is supported. When we talk about the benefits of organizations, this way of learning directly reduces the face-to-face training costs as well as the cost of travel, accommodation and training materials. It is also very easy to remember who finished and who did not finish training.

Considering that this way of teaching is realized in one of these two ways, we come to a new concept that represents a hybrid model of teaching. This type of model offers the possibility of listening to lectures simultaneously in both classical and online ways. [9] In this case, it is up to the final listener to decide which way he wants to listen to the lecture. The hybrid model represents a synchronous type of communication while Blended learning represents an asynchronous type of communication. Asynchronous communication types can be used as a complement to a synchronous communication type. [10]

7. CONCLUSION

Faced with a situation that affected the whole world, most educational institutions have been forced to switch to online teaching. The result of the test of working with students on the Microsoft Teams platform showed that by introducing a system for online teaching, we directly affect the improvement and quality of teaching. In addition to the impact on the teaching itself, a great influence was manifested in the segment of reducing the costs of educational institutions in various fields, such as the need for amphitheatres and electronic classrooms. The basic concepts of computer network security and protocols for secure communication between professors and students are covered. The main purpose of this paper is to raise awareness of the importance of teaching online. The increase in the number of users on the Internet leads to the fact that adapting to the online type of teaching should not be a big problem of adapting to end users.

Considering all the above, it can be concluded that the transition to the online way of teaching allows end listeners a comprehensive transfer of knowledge as well as re-listening to the same. This model can be used on an unlimited number of users in all Institutions, regardless of whether the field of activity of these Institutions is of educational background.

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