

## THE IMPACT OF THE COVID-19 PANDEMIC ON EDUCATION: A CASE STUDY OF THE TRANSFER TO THE ONLINE SPACE

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### Abstract

The contribution is a partial output of KEGA research task no. 011STU-4/2022 conducted at the Institute of Management of the STU in Bratislava. One of the areas significantly affected by the COVID-19 pandemic is education. Exclusion of students from face-to-face teaching required a quick reaction to these new conditions, both on the part of teachers and schools. Teaching at universities did not stop, but has moved to the online space, which has its own specifics. The article presents the results of the transfer of education to the online space at a technically oriented university. The article describes two basic tools used at the Slovak University of Technology in Bratislava, which have the task of neatly storing study materials, organizing students' work, and providing tools for their assessment and testing. The first investigated tool is MOODLE and the second is the Academic Information System - AIS. In addition to the mentioned areas, AIS also serves as an electronic student book, a communication channel, and a system for study management and administration. It offers much more functionality than was primarily used before COVID-19. In the last period, the e-learning functionality comes to the fore, which allows, among other things, the automatic entry of evaluation. On the other hand, MOODLE has a greater advantage in creating questions focused on calculations, which are created with a greater range of options and with the option of automatically filling in random values from a preset data set.

**Keywords:** COVID-19, information system, online education.

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### 1. Introduction

The COVID-19 pandemic significantly affected teaching already at the beginning of the summer semester 2020. Universities had to gradually move to the online space, both in the form of video calls and meetings with students, but also in the form of creating online courses and using online tools for teaching. At that time, public universities in Slovakia already had active Microsoft Office 365 licenses, which significantly helped universities in the initial phase. The Office 365 Teams application began to be used massively for communication with students. In addition to MS Teams, communication through the Google Suit platform, namely Google Meet, is actively used. In addition to these, the most frequently used, we can also mention others that some universities and teachers used to use, such as Zoom or Webex (Paksiova & Brauner, 2022). The aim of this post is to present the most used online teaching tools at the Slovak Technical University (STU), the Academic Information System and Moodle. These tools are often called Learning Management Systems (LMS). LMS is a software application or web-based technology that supports students in communication, serves to plan, implement, and evaluate specific teaching. The LMS gives the teacher the ability to create and deliver content, monitor student participation in education, and evaluate student outcomes.

LMS systems support web editors, which allow teachers to add study materials. The flow of information in LMS systems is not only one-way (from teacher to student) but two-way. The teacher can create assignments, tests, and activities that require student activity. LMS systems were used at STU even before the COVID-19 pandemic. Due to the impact of the pandemic, their use has increased many times. Even after the end of the pandemic and the start of face-to-face teaching, many teachers continued to use these systems.

### 2. Moodle

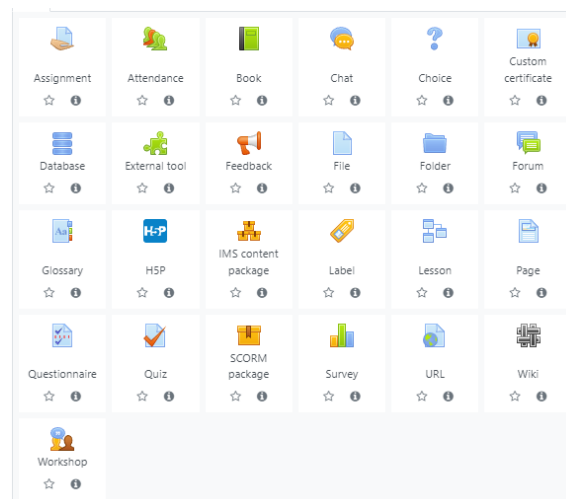
The Moodle system is a software package for the creation of educational systems and electronic courses on the Internet. It is a project that is constantly evolving, designed on the basis of a social-constructivist approach to education (Fikar, 2018). The moodle application is operated at two STU faculties, the Faculty of Chemical and Food Technology (FCHPT - <https://elearn.uiam.sk/>) and at the Faculty of Electrical Engineering and Informatics (FEI - <https://elearn.elf.stuba.sk/moodle/>). Both systems are similar based on the same source code but have a little difference that do not influence the

usability. In our work we will present the system administered at the FCHPT, that are used also on other faculties and workplaces (Institute of Management, Faculty of Civil Engineering, Faculty of Mechanical Engineering). At the time of writing, the moodle at FCHPT had 5 905 users and 260 courses (e-learning na FCHPT STU, 2022).

The user can access moodle through the web browser or through the mobile applications that are available for iOS or Android. Student and teachers can access moodle through their official university login details that are available to them. The moodle administrator creates a course and assigns a certain person as the course administrator. The course administrator can then add other people to different roles, modify their rights. The course administrator determines the enrollment methods. He has the choice between adding a student manually, self enrolment (free or password-based), or guest access. He has many options on how to modify the course. He can set up course format, visibility, timing, appearance, groups, and many others.

The best way to use the moodle is to add activity or resources for the students. Teachers can add in general two categories of modules. Sources with which they provide students with study materials. They are not interactive and serve only to provide information. Activities are interactive, where there are one-way or two-way interactions between teachers and students. Standard activities are survey, database, forum, quiz, and assignment.

Figure 1. Resources and activities in moodle.



A big advantage of the activities is clarity and the possibility of communication with the student. The student sees the assignment or description of the activity and the submission deadline. The teacher can see when the student submitted the assignment or completed the activity, can comment and evaluate. The evaluation and comments are displayed directly to the student, who can thus track his progress in the subject. In this way, information about the assessment is always available to the student in the grade section. In this way, the GDPR issue associated with mass notification of marks is eliminated. The big plus of Moodle is the question bank, which can be set up for each course. Here, the teacher can set many types of questions (multiple choice, true/false, matching, short answer, numerical, essay, calculated, etc.). Questions can be categorized into created categories and then used in the activities in the course.

The teacher can enter various goals that the student must achieve in order to move forward in the subject, e.g. achieve a certain number of points on a test or assignment, submit a homework, or so on. In the grade section, the teacher has an overview of all participants in the subject, and automatic evaluation will help him record the final grades. The user environment of moodle and its individual modules is very intuitive and can be used even by a less technically proficient person.

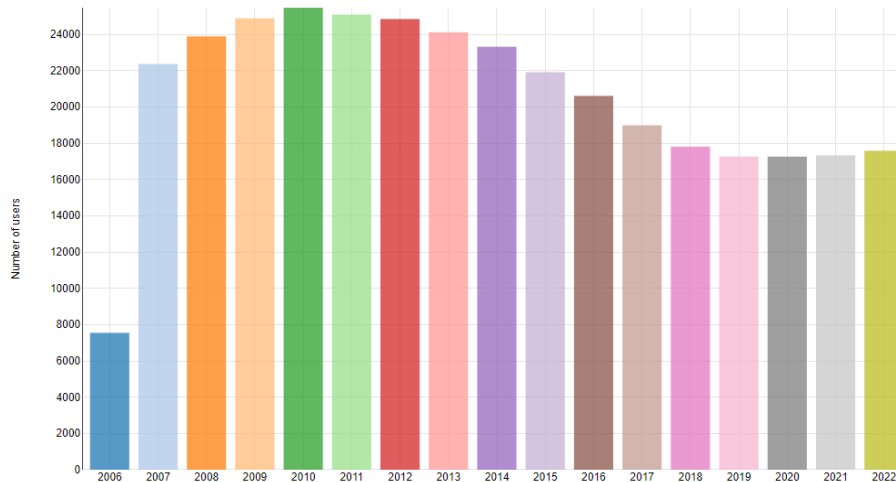
After the end of the course, the course administrator can backup the course and restore or reset it for the new semester, while he can save the backup and keep the data and files he considers necessary to the next semester.

### 3. Academic information system - AIS

The Academic Information System of Slovak University of Technology in Bratislava allows the academic community, university staff, and public to access a wide range of information (Academic Information System, 2022). The home page contains information and options for personal administration (log in, first log ins, system integrators), admission procedure (e-application form to study at STU, pre-enrollment, accommodation), information about STU (persons at STU, validity verification of

identification cards, graduates), study information (academic year schedule, study plans, course catalogue, final theses at STU), science and research information (library, projects, publications) and information about the information system (FAQ, statistics). Figure 2 shows the annual number of active users of the information system. The number of users is closely related to the number of STU students and teachers, and this trend because the use of AIS is mandatory at STU.

Figure 2. The annual number of active users of the AIS at STU.



After login in to AIS users can see the personal administration page that contains information about their study/teaching and other useful tools and documents. The AIS has many more functions than moodle, because it is mainly study administration and, communication tool and as an addition, it supports LMS. In this paper, we will focus on AIS LMS module. The main module for LMS is eLearning. It contains eLearnings projects, electronic study materials, tests and examinations. The first step to use LMS module eLearning is to set up an eLearning project. An e-Learning project is a standalone object that will combine all materials related to one e-learning project and is independent of the taught subject. Subsequently, it can be linked to the currently taught subjects and thus made available to students.

In addition to providing information and study materials, eLearning is also suitable for online testing of students. The teacher can create a Test base with questions that can be categorized into created folders. The types of questions that teacher can add are: 1 from N, dichotomic, selective M from N, forced selection, verbal, matching, open, ordering, filling in, connecting, and so on. The biggest advantage compared to moodle is automatic assessment. The results of the test can be automatically transferred to the evaluation page, and the teacher can automatically write subject grades for the student. It is a great help especially in subjects with a large number of students. In this way, the possibility of errors is eliminated in the manual recording of grades.

#### 4. Conclusions

A detailed description of the LMS systems used at STU would require much more space. This article briefly describes the main modules and functionalities that are used at STU in Bratislava and that significantly helped move teaching to the online space during the COVID 19 pandemic. The moodle system has its advantages, especially in the area of testing calculation tasks, where automatic calculations are possible based on programmed entries with the import of a large number of variations. The LMS modules offered by the AIS system stand out mainly due to their integration into the main administrative and communication system of the STU, which is mandatory.

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