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FACULTY OF ELECTRICAL ENGINEERING

ETIMA 2021

FIRST INTERNATIONAL CONFERENCE

19-21 OCTOBER, 2021

TECHNICAL SCIENCES APPLIED IN ECONOMY, EDUCATION AND INDUSTRY

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FACULTY OF ELECTRICAL ENGINEERING

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PREFACE

The Faculty of Electrical Engineering at University Goce Delcev (UGD), has organized the International Conference ***Electrical Engineering, Informatics, Machinery and Automation - Technical Sciences applied in Economy, Education and Industry-ETIMA*.**
ETIMA has a goal to gather the scientists, professors, experts and professionals from the field of technical sciences in one place as a forum for exchange of ideas, to strengthen the multidisciplinary research and cooperation and to promote the achievements of technology and its impact on every aspect of living. We hope that this conference will continue to be a venue for presenting the latest research results and developments on the field of technology.
Conference ETIMA was held as online conference where contributed more than sixty colleagues, from six different countries with forty papers.
We would like to express our gratitude to all the colleagues, who contributed to the success of ETIMA'21 by presenting the results of their current research activities and by launching the new ideas through many fruitful discussions.
We invite you and your colleagues also to attend ETIMA Conference in the future. One should believe that next time we will have opportunity to meet each other and exchange ideas, scientific knowledge and useful information in direct contact, as well as to enjoy the social events together.

The Organizing Committee of the Conference

ПРЕДГОВОР

Меѓународната конференција ***Електротехника, Технологија, Информатика, Машинство и Автоматика-технички науки во служба на економија, образование и индустрија-ЕТИМА*** е организирана од страна на Електротехничкиот факултет при Универзитетот Гоце Делчев.
ЕТИМА има за цел да ги собере на едно место научниците, професорите, експертите и професионалците од полето на техничките науки и да представува форум за размена на идеи, да го зајканува мултидисциплинарното истражување и соработка и да ги промовира технолошките достигнувања и нивното влијание врз секој аспект од живеењето. Се надеваме дека оваа конференција ќе продолжи да биде настан на кој ќе се презентираат најновите резултати од истражувањата и развојот на полето на технологијата.
Конференцијата ЕТИМА се одржа online и на неа дадоа свој допринос повеќе од шеесет автори од шест различни земји со четириесет труда.
Сакаме да ја искажеме нашата благодарност до сите колеги кои допринесоа за успехот на ЕТИМА'21 со презентирање на резултати од нивните тековни истражувања и со лансирање на нови идеи преку многу плодни дискусии.

Ве покануваме Вие и Вашите колеги да земете учество на ЕТИМА и во иднина. Веруваме дека следниот пат ќе имаме можност да се сретнеме, да разменime идеи, знаење и корисни информации во директен контакт, но исто така да уживаме заедно и во друштвените настани.

Организационен одбор на конференцијата

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OPEN SOURCE LEARNING PLATFORM – MOODLE

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Abstract
LMS Moodle platform has begun to be used during a military exercise for cadets, organized by the Military Academy "General Mihailo Apostolski" – Skopje in the Republic of North Macedonia. It was available to all cadets who participated in that exercise. Later, the platform has been started to be used in the academic part of teaching. Exploiting the platform, the analyses has been conducted in terms -of the results of cadets who have used it versus those who have not. Also, the platform is suitable for online learning, and it is completely safe for use within the university. The recent use of this platform pro-vides insight into the fact that in the future it will be increasingly used both in the field and in academic conditions due to its enormous benefits.

Key words
analysis, online learning, LMS, Moodle, military exercise, academic, increasingly.

Introduction

Today in the world we can see the improvement of technology in every aspect of life. Education is one of that aspects. The using of e – learning in last few years is in increase.
Namely, the term "e-learning" was first used at a seminar on CBT systems in 1999, while at the beginning of the 21st century businesses adopted this type of learning as a central way of training and training workers [1]. When begun a COVID – 19 pandemic, we saw advantages of e – learning.
Currently, it is estimated that the online education industry is worth approximately 38 billion Euros. In the United States, 3.5 million students are enrolled in online degree courses [2]. Many students around the globe are learning on this way since pandemic start, and without e – learning they would be far behind with education. The goal of this paper is to review the most valuable option for online learning, the Moodle's online learning platform, highlight its features and show how they influence in learners learning performance and make online learning environment a valuable asset in distributing knowledge. Moodle's e-learning platform through its features gives students' greater access to education in comparison to traditional methods of teaching, as students can undertake their study from anywhere and at any time as well as being given the option to study part-time or full-time. Moodle platform in this moment is one of the most useful software in learning, on this platform student have many options like blogs, chats, database activities, glossaries. And due to the mentioned reasons, choosing a proper online learning platform is one of the keys to successful education, therefore, it is very important for educators to familiarize themselves with the features and options those platforms can offer.

1. Moodle

Moodle is a free software, a learning management system providing a platform for e-learning and it helps the various educators considerably in conceptualizing the various courses, course structures and curriculum thus facilitating interaction with online students.
Moodle was devised by Martin Dougiamas and since its inception, its primary agenda has been to contribute suitably to the system of e-learning and facilitate online education and attainment of online degrees.
Moodle actually stands for Modular Object-Oriented Dynamic Learning Environment and statistics reveal that about 14 million consumers are engaged in about 1.4 million courses propagated by this learning management system [3].

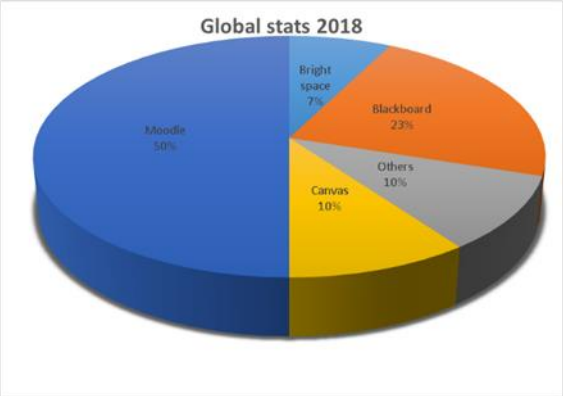

Figure 1 The figure shows usage of Moodle's platform.

2.Advanced Distributed Learning – Military Academy "General Mihailo Apostolski"

The section title LMS Moodle platform at the Military Academy "General Mihailo Apostolski" as we early said, began to be used during the military exercise for hooking some material about military doctrine. On this exercise LMS Moodle platform was very useful for cadets and commanders. So they started to use this platform in academic part of learning and upload materials of some subjects. Since then LMS Moodle has proven to be successful in learning process. Especially when pandemic started, cadets from home could not reach the library at the Academy and all materials was on Moodle platform. Current learning on Military Academy cannot be imagined without Moodle platform. When they at the Academy, cadets could reach the platform from modem which is connected with internal protected military network, and from that internet to web server and to Moodle database server as is show on figure 2. should be relevant for the text content

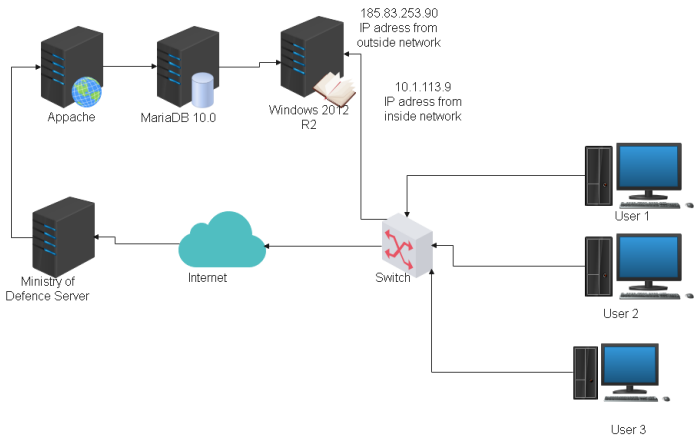

Figure 2 Moodle access scheme.

At this moment LMS Moodle platform is used by two universities, University „Goce Delcev“ - Shtip, Military Academy “ General Mihailo Apostolski” is part of this university and second is European University – Skopje. Faculty of Informatics, which is part of this university, use LMS Moodle platform. Current courses on LMS Moodle platform is one part of Military Academy program and part is from Faculty of Informatics. Military Academy has two study cycles and for officers in the service. While Faculty of Informatics has one study cycle for all four years of studying.

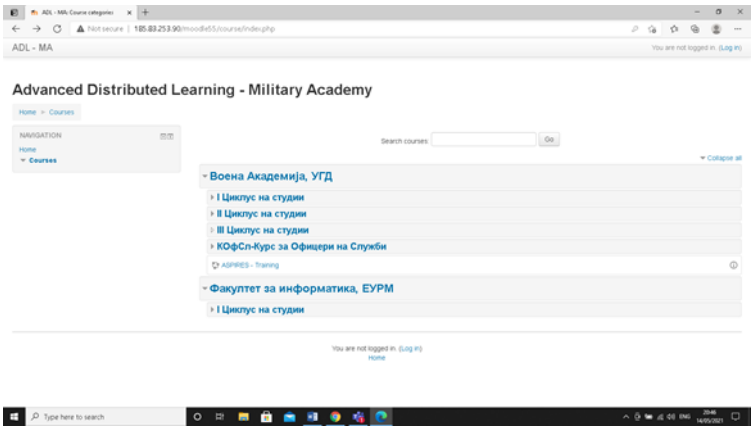

Figure 3 LMS Moodle platform.

3.Installation and configuration of the LMS Moodle platform

The LMS Moodle platform can be installed on several OS, such as Linux, Windows, Solaris and Mac. On Military Academy we installed LMS Moodle on Windows OS. Installation LMS Moodle on Windows is easy and practice. Before getting started with Moodle LMS installation, it is necessary to know which hardware is going to best support to users and data. Managed Moodle Cloud Hosting is the recommended option as it will support any amount of users and will ensure Moodle site doesn’t crash if user exceed his capacity. When user knows his capacity, it is time to install database server. The three databases recommended by Moodle are MySQL, MariaDB, or PostgreSQL. Except database server, it is necessary to install web server. Apache 2 is the recommended web server to use with Moodle because it has been tested and verified. IIS 7/8 has also been used in the past but has not been tested for the same reliability as Apache 2. Also very important thing to do is install PHP. When installing a PHP on operating system, best practices need to be followed. Next thing is download and copy the Moodle files from download.moodle.org. There are a number of different places that user can obtain Moodle’s open source code from. It is possible that user download the standard version from Moodle as his site will be better supported for security and bug fixes from a trusted Moodle Partner. Once downloaded, a directory called “Moodle” will appear which contains a number of files and folders. Moodle data directory and secure database should be created immediately after. It is necessary to create data directory to store all of Moodle files (this includes uploads, cache, session data, even temporary data). Once a Moodle data directory was created, it is important to take appropriate measures to secure this data. To begin, it is recommended to ensure that directory is NOT accessible directly via the web. If user is hosting Moodle internally, it is vitally to be create an empty database for the installation. If user is outsourcing hosting, he need to find a web-based administration page for databases as part of the control pane. It is recommended that user outsource his hosting to a specialized Moodle hosting vendor. After all of this it is time to begin installation. It is important to Run the installer to create Moodle database tables so user can configure his new site. It is also recommended to do

setup backups. There are countless errors that may cause Moodle site to crash resulting in the loss of courses, student data, and history. Ensuring that a proper backup and disaster recovery system is in place will be the difference between business failure or business continuity. It is important that Moodle courses are backed up in addition to Moodle data, Moodle directories and users Moodle site configuration. Backups should be performed hourly and stored in multiple geographic locations in the case of a natural disaster. With Managed Moodle Cloud Hosting, this is all taken care off. And last but not least thing is checking server security and performance. There are many factors to consider to ensure that Moodle operates with optimal performance and compliance with regulatory safety standards. A poorly executed Moodle site results in slow page loads, lagging videos, system crashes, and security / vulnerability threats. To accurately check server security and performance, the user will want to collect reference data from performance monitoring sites. It can then measure exactly how well its Moodle page is working. Examples of performance metrics for comparison are: scalability, server clusters, hardware configuration, operating system speed, web server performance, PHP performance, and database performance [4].

Also we can configure Moodle platform for some additional options. One of them is advanced features which is site that really extend the functionality of Moodle, but are not considered plugin based. These advanced features can be enabled or disabled as needed. There are quite a few features that the user has to choose from: Outcomes -These are goals that set up in a course and attach to learning activities, to help evaluate a learner's competence in a subject. Web Services - When enabled, these can be used to connect Moodle with other applications. Completion Tracking - It is possible to follow the criteria for courses, and the activities within those courses. Conditional Access - Here user can restrict the access users have to the learning resources and activities within a course, based on their different qualifications such as grades, completion status (of other activities), profile fields, and groups they belong to. Second additional option is users. User accounts are the profiles created for the learners in the Moodle site, that require the person to login to his or her account using a username and password. There are quite a few different ways to create users. Once the accounts are created, users can then begin enrolling in courses. Registration, Authentication, And Enrollment for the sake of simplicity, it will break registration into 3 main categories: User-based, Manager- or Administrator-based, and Automated. This can use a combination of multiple authentication methods. And the fourth and last additional option is course enrolment. Enrollment is the method of adding users to a course so that they can participate and engage within the course. Moodle is modular in nature, so it offers many different ways to enroll a user in a course: Self-enrollment is the method that allows users to manually enroll themselves in a course. This is a great option if teacher want learners to be able to choose which courses they would like to take, or if the courses are optional; Manual enrolment is done by an administrator, manager, or instructor. This method works well when there are a small number of users A Cohort Sync allows a manager or administrator to add users into a group called a "Cohort." They can then enroll an entire cohort into a course, thus adding multiple, grouped users; There is a PayPal method of enrollment, that allows users to browse courses, enroll in a selected course, and pay for it through PayPal. This is the method to use when access to content is being sold, and when studants are picking their own courses. It is also well suited for client training, and/or partner training where the list of users is unknown [5].

4.BigBlueButton in Advanced Distributed Learning – Military Academy

The Moodle platform on Military Academy provides professors opportunity to create online courses with access that only registered students have.

Moodle facilitates the exchange of information to educational communities, develops a student-centered approach, and ultimately strengthens social interaction. The flexibility of the

Moodle platform allows students to access uploaded materials at any time and from anywhere. It also allows for a range of interactions between teachers and students. Students have ample time to thoroughly discuss and exchange ideas. This platform allows teachers and students living in different geographical areas to exchange information through synchronous and asynchronous communication. Professors who use Moodle will have complete control over their students 'records. Activities are checked online. Professors can see what students have been doing during a given time frame [6].

BigBlueButton is an open source web conferencing system for online learning. The goal of the project is to enable instructors to effectively engage remote students. The project supports live online classes, virtual office hours, and group collaboration with remote students.

BigBlueButton supports real-time sharing of slides (including whiteboard), audio, video, chat, emojis, breakout rooms, and screen. It also record all content for later playback. Like Moodle, BigBlueButton is open source. The BigBlueButton project was started in 2008 by Blindside Networks. In addition our work on BigBlueButton core, we created this BigBlueButtonBN Moodle plugin so you can fully leverage BigBlueButton's capabilities from within your Moodle site.

For example, for this pandemic situation it is better to use BBB than Microsoft Teams, because Teams record every conversation and storage Microsoft database, to which we do not have access. And with using of BBB we have complete control over our conversation. The BigBlueButtonBN plugin enables you to:Create multiple activity links to online sessions within any course, Restrict students from joining a session until a teacher (moderator) joins the session, Launch BigBlueButton in a separate window, Create a custom welcome message that appears at the top of the chat window when joining the session, Specify join open/close dates for the session that appears in the Moodle's calendar, Record a session, Access and manage recordings [7].

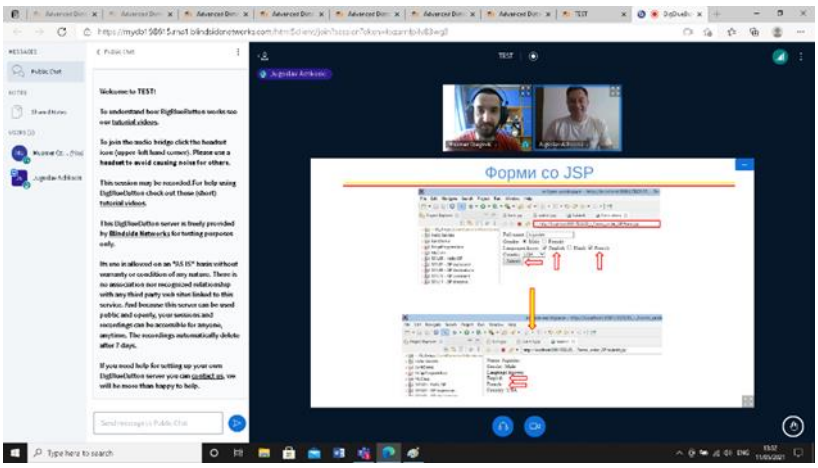

Figure 4 An example of learning through BBB.

5.Testing implemented system

In this first graph we can see an example of data that professor can see about a student. This is data from military exercise in 2019 (we said earlier that LMS Moodle platform began to use in military exercise). The graph shows the student who joined to Moodle platform on June 10th to look three different materials. First material which student opened was training plan on June 10th at 9:29 p.m. Second material was instructions for shooting with infantry weapons also on June 10th at 9:30 p.m.

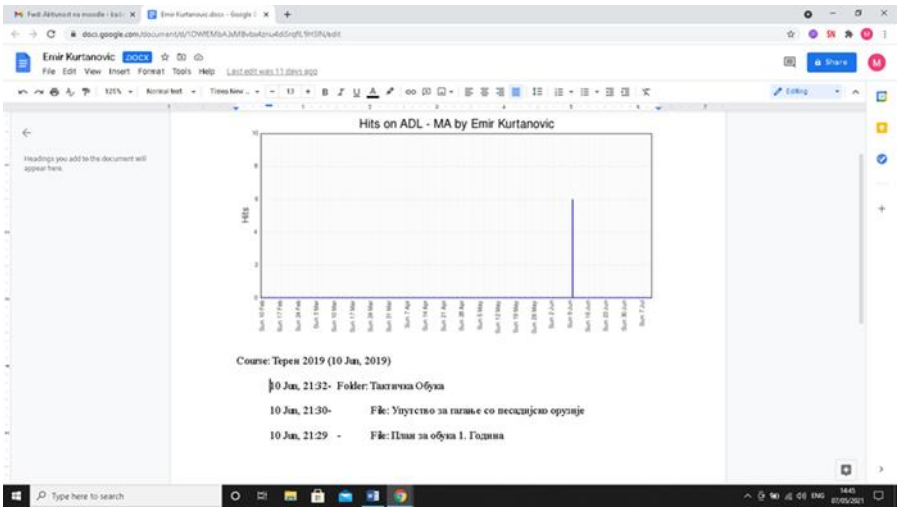

Figure 5 Graph number 1.

The second graph shows a different student, these data are also from the 2019 military exercise. This student first joined the LMS Moodle platform in March, when the materials were uploaded. He joined for the second time in April, and the third time on June 10 when the exercise began. First material which second student opened was on March 2019 but we don't have information for the materials in that period. He opened instructions for shooting with infantry weapons on June 10th at 02:24 a.m. Also he opened second year training plan and tactical training at 02:27 a.m.

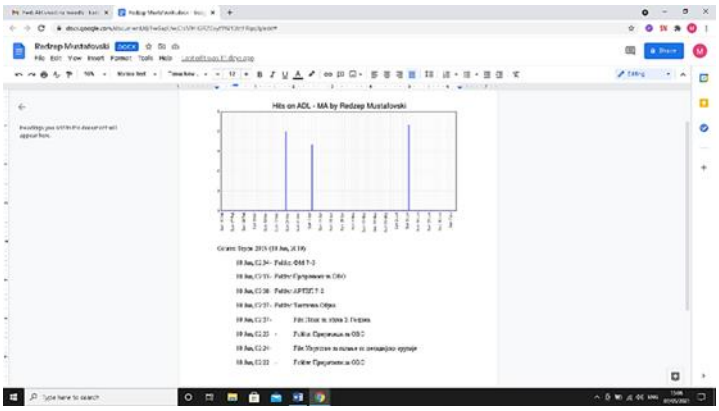

Figure 6 Graph number 2.

Conclusions

The LMS Moodle platform, as we have seen, has a number of advantages and this platform is an educational future. Some advantages are collaborative tools and activities, easy to install, easy to use interface, users can have a large number of materials, learning in a state when it is impossible in college, etc. Many students and professors did not recognize Moodle as a useful learning platform, but when the pandemic began, professors uploaded many books, materials, and quizzes for students at home to Moodle. It was the LMS Moodle platform at the Military Academy that helped many students study. In the future, LMS Moodle will be used even more, because technology is evolving every day, also our need for technology will be greater and it is logical that we want to develop our education system. This pandemic shows us that online learning is as feasible and well-done as convection learning. As Moodle has spread and the community has grown, more input is being drawn from a wider variety of people in different teaching situations. Moodle development is increasingly influenced by its community of developers and users. Moodle is an active work in progress and constantly

evolving to a better state, and due to its open source nature it allows its huge community to contribute and change the platform towards a better state. All in all, combining all of the above, similar features are hard to find for no charge and that is what makes Moodle the perfect advanced distributed learning platform intended for every use.

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