

ONLINE AND E-LEARNING BEST PRACTICES, NEEDS AND HABITS FOR THE INTERNATIONAL AGRIMBA NETWORK

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Abstract: From the literature part of this research, it shows that, some of the most popular Learning Management Systems (LMS), such as Moodle, Canvas and Blackboard, are used by many universities and colleges worldwide and their popularity is steadily increasing as more institutions adopt online learning. The usage statistics of LMSs by universities can be influenced by a number of factors, such as the size of the university, the specific requirements of the institution, the availability of alternative solutions, and the preferences of faculty and students. In addition, the popularity of LMSs among universities may change over time as new systems enter the market or as existing systems improve and evolve. Based on the number of customers, Moodle's three biggest competitors in the learning management systems category are Google Classroom with 11.70%, LinkedIn Learning with 8.87% and TalentLMS with 5.16% market share. The most frequently used functionalities of the e-learning system are: study content creation, course management and content library, and the least frequently used are integration with other systems, multilanguage utility, plagiarism checking, accessibility to people with disabilities and personalized learning. Similarly, the most popular functionalities are course management, study content creation and assessment and testing. Respondents least liked the functions of integration with other systems, webinars, accessibility for inclusion, and video hosting and streaming. Lectures or slides are most often uploaded to platforms, followed by written materials and links, then videos, pictures and tables. Judging by the answers received, the majority of respondents are either completely satisfied (34%) or moderately satisfied (42%) with the e-learning systems they are using now.

INTRODUCTION ON LEARNING MANAGEMENT SYSTEMS

ABOUT LMS IN GENERAL

A Learning Management System (LMS) is a software platform that manages courses, training programmes and assessments. LMSs provide an online space where trainers and learners can interact, collaborate and access learning materials (Bradley, 2021).

Some key features of LMSs are (David, 2022; Ippakayala, 2017 and Nurassyl, 2020):

- Course management: LMSs allow instructors to create, manage and organise content, including multimedia materials, tests, assignments and assessments.
- Tracking learners: LMSs can track learners' progress and generate reports on their activities and performance.
- Collaboration and communication: LMSs provide tools for learners to communicate and collaborate with each other and with the instructor, such as forums, messaging and wikis.
- Assessment and testing.
- LMSs can be used in a variety of settings, including education, corporate training and other training. They can be

cloud-based or deployed on-premises, and some are open source, meaning that the code can be accessed, modified and distributed by anyone.

- In addition to the basic functions outlined above, modern LMSs often offer a range of advanced features that support the delivery of engaging and effective learning experiences. Some of these features include:
- Gamification: LMSs can use gamification techniques such as points, badges and leaderboards to motivate learners and make learning more enjoyable.
- Adaptive learning: some LMSs offer adaptive learning features that allow the system to modify the learning experience according to the learner's individual needs and progress.
- Mobile learning: Many LMSs are optimised for mobile devices, allowing learners to access learning materials and assignments on the go.
- Collaborative learning: LMSs can facilitate collaborative learning by providing learners with opportunities to interact and collaborate with peers, tutors and other experts in their field.
- Integration: LMSs can be integrated with other systems and tools such as HR systems, e-commerce platforms and student information systems to streamline workflows and improve data management.

- LMSs have become increasingly important with the growing demand for online and distance learning. They provide a convenient and flexible way for learners to access educational content and support their learning journey, while also providing instructors with tools to manage and track learner progress. For long-term sustainability, it is essential to use an LMS that meets the specific needs of the organisation, taking into account factors such as cost, functionality and ease of use.

TOP 20 POPULAR LEARNING MANAGEMENT SYSTEMS (LMSS)

Today there are many LMS systems available. Many aspects can influence which one becomes popular or not. Statistics show that the following 20 LMS systems are the most popular (elearningindustry.com, 2023; Bouchrika, 2023): Moodle, Blackboard, Canvas, Schoology, TalentLMS, D2L BrightSpace, Instructure Canvas, Adobe Captivate Prime, Edmodo, Google Classroom, Talentsoft, Absorb LMS, Docebo, LearnUpon, Saba Software, SAP Litmos, Edsby, Talentedge, Thinkific, LatitudeLearning.

The list is not exhaustive and there are many other LMSs available, each with their own strengths and weaknesses. When choosing an LMS, it is important to consider specific needs and requirements, advanced features, ease of use, scalability, cost and customer support.

CONSIDERATIONS FOR COMPARING THE LMS

LICENCE TYPE			
Free LMS		Commercial LMS	
SOURCE CODE AVAILABILITY			
Open source LMS		Proprietary LMS	
LICENSING MODELS			
Per number of registered users	Per number of connected users	Per license validity period	Per number of courses
INSTALLATION TYPE			
Hosted (Software as a Service)		Own	
BUSINESS ORIENTATION			
eCommerce	Educational institutions	Corporate training	Government structures
ELEARNING STANDARDS COMPLIANCE			
International Standard (SCORM, AICC, IMS)	Local standards	No standards	
CONTENT CREATION POSSIBILITIES			
Integrated tools for courses creation	Separate tools for courses creation	Possibility to use reusable content only	
INTEGRATION POSSIBILITIES			
Open source	Documented API (SDK)	Integration via bridges	

source: Ouadoud et. al., 2017.

Some of the most popular open-source LMSs:

- Moodle
- ILIAS
- ATutor
- Chamilo
- OpenEdX
- Canvas LMS (offers a free version for K-12 schools)
- Schoology (offers a free version for K-12 schools)
- Google Classroom (free for personal use)
- Classcraft (free for teachers)

Available Own server hosted Learning Management Systems (LMS)

There are both commercial and open-source options available.

Commercial:

- Blackboard Learn
- Canvas LMS
- Schoology
- Brightspace by D2L
- Instructure

Open-Source:

- Moodle
- ILIAS
- ATutor
- Chamilo
- OpenEdX

When selecting a self-hosted LMS, it is important to consider factors such as the technical expertise required for installation and maintenance, the cost of hardware and software, the level of support provided by the vendor or open source community and the level of security available.

Cloud-based LMSs

The most popular free LMSs:

- Moodle
- ILIAS
- Canvas LMS
- Open edX

Commercial LMSs that can be hosted on the cloud include:

- Blackboard
- D2L (Desire2Learn)
- Schoology
- TalentLMS

Some LMSs may be free to use but there may be additional costs for hosting, customization, and support. Additionally, free LMSs may have limited features and support compared to commercial ones.

GROUPING POSSIBILITIES

LMSs can be grouped into several categories based on their features, capabilities, and intended use cases. Some common categories include (Faith, 2022):

- Open-Source LMSs: LMSs that are freely available and can be modified and customized as needed. Examples include Moodle and ILIAS.
- Commercial LMSs: LMSs that are purchased and supported by a vendor. Examples include Adobe Captivate Prime and Docebo.
- Cloud-Based LMSs: LMSs that are hosted and maintained by the vendor, with users accessing the platform through a web browser. Examples include TalentLMS and Absorb LMS.
- Enterprise LMSs: LMSs designed for large organizations, often with advanced features and customization options. Examples include SAP Litmos and Cornerstone OnDemand.
- Small Business LMSs: LMSs designed for smaller organizations and businesses, with simplified interfaces and streamlined features. Examples include Thinkific and LearnWorlds.
- Niche LMSs: LMSs designed for specific industries, such as healthcare or education, or for specific types of training, such as safety or compliance training. Examples include Edmentum and Workday Learning.

AVAILABLE MODULES ON LMS SYSTEMS

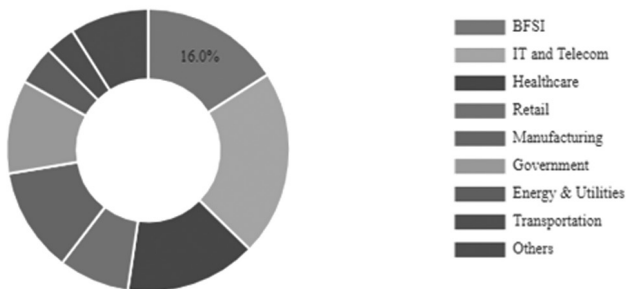
1. Course management and content creation: This module allows for the creation and management of courses, including the addition of content, activities, and assessments.
2. User management and enrolment: This module manages the registration, enrolment, and tracking of users, including role management and access controls.
3. Assessment and testing: This module provides the ability to create and administer quizzes, exams, and other assessments to measure learning and understanding.
4. Reporting and analytics: This module generates reports and provides data and insights on learner activity and performance, course completion rates, and more.
5. Gamification and rewards: This module incorporates game-like elements and rewards to encourage learner engagement and motivation.
6. Communication and collaboration tools: This module includes features such as forums, chat, and messaging to facilitate communication and collaboration among learners and instructors.
7. Social learning: This module enables learners to interact with one another, share knowledge and experiences, and form communities.
8. Content library: This module provides a centralized repository for storing and sharing learning resources and materials.
9. Virtual classrooms and webinars: This module provides live, interactive, and remote learning experiences through virtual classrooms and webinars.
10. Mobile learning: This module enables learners to access learning resources and participate in courses using mobile devices.
11. eCommerce and billing: This module allows for the sale and purchase of courses and other learning products, along with the management of payments and billing.
12. SCORM and xAPI compatibility: This module enables compatibility with widely-used e-learning standards, such as SCORM and xAPI, to support the use of existing learning resources and content.
13. Compliance and certification tracking: This module tracks compliance and certification requirements and generates reports and certificates as needed.
14. Multi-language support: This module provides support for multiple languages, allowing for the creation and delivery of courses in different languages.
15. Integration with other tools and systems: This module enables integration with other systems, such as HR and ERP systems, to streamline data and workflows.
16. Custom branding and styling: This module provides customization options for branding, style, and overall look and feel.
17. Virtual reality and augmented reality: This module incorporates virtual and augmented reality technologies to provide immersive and interactive learning experiences.
18. Personalized learning and adaptive courses: This module provides customized and adaptive learning experiences based on individual learner needs and preferences.
19. Accessibility and inclusive design: This module is designed to be accessible to learners with disabilities and to comply with accessibility standards.
20. Blended learning and flipped classroom: This module supports blended learning and flipped classroom approaches, combining traditional and online learning methods.
21. Micro-learning and bite-sized content: This module provides short, focused, and easily-digestible learning experiences.
22. Compliance reporting and data privacy: This module ensures compliance with data privacy regulations and generates reports on data use and protection.
23. Video hosting and streaming: This module provides hosting and streaming capabilities for videos and other multimedia content.
24. Automated email and notifications: This module generates automated email and notifications to learners, instructors, and administrators.
25. User engagement and interaction tracking: This module tracks and measures user engagement and interaction with course content and activities.

USAGE STATISTICS OF THE LMSS

Usage statistics are influenced by a number of factors, it is important to consider the following needs in the selection process (Bouchrika, 2023). Ease of use: the best LMS platforms are easy to use and require little or no training. They should be intuitive and user-friendly. Features: The best LMS platforms offer a robust feature set that meets the needs of both businesses and learners. Customer support: Some LMS platforms offer customer support so you can get help when you need it. Pricing: the best LMS platforms are affordable and offer a range of pricing options to suit your budget. Scalability: the best LMS platforms are scalable, so you can grow your learning program as your needs change. Usage statistics can vary widely and are difficult to compare directly, as different universities may use different LMSs. Some of the most popular LMSs, such as Moodle, Canvas and Blackboard, are used by many universities and colleges worldwide and their popularity is steadily increasing as more institutions adopt online learning (Bouchrika, 2023).

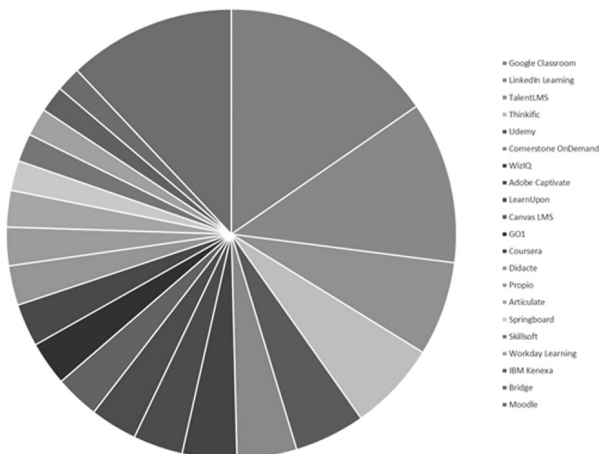
As can be seen from the figure below, the use of LMS systems is present in all sectors and the continued growth in the size of the LMS market also indicates that it is increasing fast.

Figure 1.1.: Global learning Management System Market Share by industry



Source: Fortune Business Insights (2023)

Figure 1.2.: Market Shares of the different LMSs



Source: 6sense (2023)

The usage statistics of LMSs by universities can be influenced by a number of factors, such as the size of the university, the specific requirements of the institution, the availability of alternative solutions, and the preferences of faculty and students. In addition, the popularity of LMSs among universities may change over time as new systems enter the market or as existing systems improve and evolve.

As can be seen from the figure below, based on the number of customers, Moodle's three biggest competitors in the learning management systems category are Google Classroom with 11.70%, LinkedIn Learning with 8.87% and TalentLMS with 5.16% market share.

STRONG AND WEAK POINTS OF 5 POPULAR LMSS

MOODLE

Moodle is a popular and widely used open-source learning management system (LMS) (Faith, 2022; Rajagukguk, 2020; Al-Ajlan-Zedan, 2008; Abdallah, 2022; Mpungose, 2022; Moodle, 2023)

Strong Points:

- Customizability: Moodle allows for a great deal of customization, from the appearance of the platform to the features and functionalities it offers.
- User-friendly interface: Moodle has a user-friendly interface that is easy for students, teachers, and administrators to use.
- Open-source software: Moodle is open-source software, which means that it is free to download and use, and users have access to the source code. This also means that users can contribute to the development of the platform.
- Large community: Moodle has a large and active community of users, which means that users can access support and resources, and share knowledge and experiences.
- Wide range of features: Moodle offers a wide range of features, including course management, student tracking, assessment, collaboration tools, and more.

Weak points:

- Complexity: Moodle can be complex to set up and use, especially for those who are not familiar with the platform or with technology in general.
- Limited reporting capabilities: Moodle's reporting capabilities are limited compared to other LMSs.
- Customization can be difficult: Although Moodle allows for a great deal of customization, making those changes can be difficult for those who are not familiar with programming.
- Performance issues: Moodle can experience performance issues, particularly when used by a large number of users or when used for large courses with many resources and activities.
- Lack of integrated mobile app: Moodle does not have an integrated mobile app, which means that users have to access the platform through a mobile browser.

Blackboard

Blackboard is a popular commercial LMS used by many universities and institutions (Abdallah, 2022; Mpungose, 2022; Blackboard, 2023).

Strong Points:

- Customization: Blackboard provides a range of customization options that allow institutions to tailor the platform to their specific needs.
- User-Friendly Interface: Blackboard has a user-friendly interface that makes it easy for teachers and students to navigate and use the platform.
- Mobile Support: Blackboard provides a mobile app that allows students to access course content and participate in discussions from their smartphones.
- Integration: Blackboard integrates with a range of other tools and platforms, including social media, e-portfolios, and e-textbooks.

Weak points:

- Cost: Blackboard is a commercial LMS and can be expensive, especially for institutions with limited budgets.
- Technical Support: Some users have reported issues with Blackboard's technical support and service, which can be slow to respond and resolve issues.
- Complexity: Some users find Blackboard to be complex and difficult to use, particularly those who are not familiar with LMS platforms.
- Limited Customization: While Blackboard provides some customization options, some users feel that the customization options are limited compared to other LMS platforms.

Canvas

Canvas LMS is a cloud-based learning management system that provides a wide range of features and tools for creating, delivering and managing online courses (Mpungose, 2022; Canvas, 2023).

Strong points:

- Easy-to-use user interface that makes it simple for instructors and students to navigate
- Customizable course pages and modules for a personalized experience
- Robust analytics and reporting features to track student progress and engagement
- Integration with a wide range of third-party tools and apps
- Mobile app for easy access to course materials from any device
- Extensive support and training resources to help users get the most out of the platform

Weak Points:

- Can be difficult to use for those who are not familiar with online learning platforms
- Some features and tools are not as intuitive as they could be

- Some users have reported difficulties with the platform's speed and performance
- Some reports of technical support response times being slower than desired.

Google Classroom

Google Classroom is a free web-based LMS developed by Google (Husain, 2023).

Strong points:

- User-friendly interface and easy to use
- Integration with other Google products such as Gmail and Google Drive
- Accessibility from any device with internet access
- Real-time collaboration and communication features
- Automated grading and organization of assignments

Weak points:

1. Limited customization options
2. Limited reporting and analytics capabilities
3. Limited ability to manage larger courses with multiple sections and instructors
4. No integration with third-party tools and resources
5. Limited functionality for creating and managing exams and assessments.

ILIAS

ILIAS is an open-source learning management system (LMS) that is designed for educational institutions and businesses (Ilias, 2023).

Strong points:

- Open-source: ILIAS is free to use and can be customized to meet specific needs.
- Flexibility: ILIAS is highly customizable, allowing users to adapt it to their specific needs and requirements.
- User-friendly: ILIAS has a user-friendly interface, making it easy for both students and teachers to use.
- Collaboration: ILIAS provides a range of tools for collaboration, including forums, wikis, and chat rooms.
- Accessibility: ILIAS is accessible and can be used on a range of devices, including computers, tablets, and smartphones.

Weak points:

- Complexity: ILIAS can be complex and challenging to use, especially for those who are not tech-savvy.
- Lack of support: As an open-source platform, ILIAS has limited support, which may make it challenging for users to resolve issues.
- Limited resources: There may be limited resources available for ILIAS, making it difficult for users to find help when they need it.
- Integration: Integrating ILIAS with other systems can be challenging, which may limit its effectiveness for some users.
- Customization: Customizing ILIAS can be time-consuming, especially for those without technical expertise.

MATERIAL AND METHODS

The research began with a review of cutting-edge resources and best practices implemented in e-learning systems at leading universities in Europe. This was based on the desk-research and online experts meetings for discussion of particular solutions. The second step was taken to investigate the needs of users and the types of software functionalities, which AgriMBA network institutions and students expect from such a Pan-European Learning system. For this task, a broad survey was conducted on users' preferences towards different features and options of e-learning systems. An intentional sample was used for the survey, consisting mainly of lecturers from the AGRIMBA network who use e-learning platforms. The invitation to participate was sent by e-mail to at least 10 addresses at each university that is a member of AGRIMBA.

RESULTS OF THE ONLINE QUESTIONNAIRE ON THE USES OF UNIVERSITY E-LEARNING PLATFORMS

A total of 71 people from 18 universities participated in the online survey. Most participants were from the Czech University of Life Sciences (22.54%), the Slovak University of Agriculture (16.90%) and the University of Debrecen and Technical University of Moldova (14,08%) (Figure 3.1).

The largest number of respondents is in the 40-49 age group (34 out of 71). The number of younger people from this group (18) is almost the same as the number of older than 50 years people (19). This is due to the employment structure at the universities. (Figure 3.2).

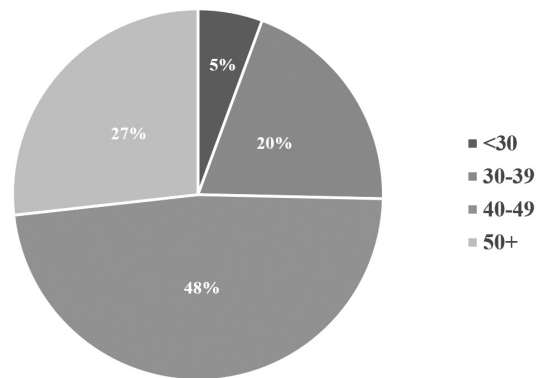
When it comes to the professional sphere, as many as 28 respondents (39%) represent the field of Economics of food supply chains. This is followed by the field of management with 16 participants, followed by Business Planning with 5 participants. Three respondents represent the fields of marketing and economics, while there were one or two respondents in the other fields (Figure 3.3).

The most frequently used e-learning platform among respondents is the Moodle platform, which is used by 78% of respondents. Brightspace, MS Teams, Google Classroom

and Blackboard are used somewhat more among other platforms, or different e-learning tools are combined (Figure 3.4).

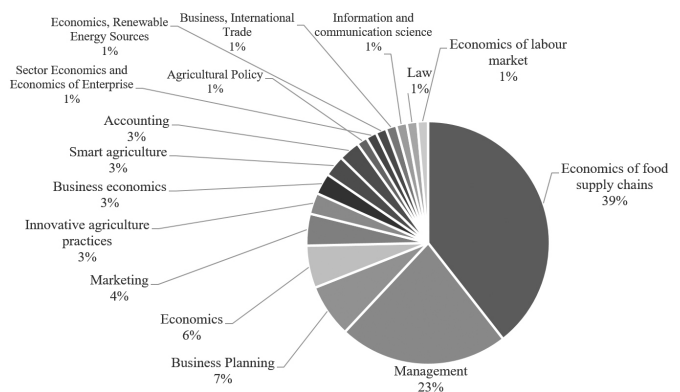
Respondents are of the opinion that there is sufficient interest in the use of e-learning systems at their universities (63%). Their use has certainly increased during the period of the COVID-19 pandemic. However, 35% of the respondents believe that this interest is not sufficient considering the possibilities and needs (Figure 3.5).

Figure 3.2. Age structure of respondents



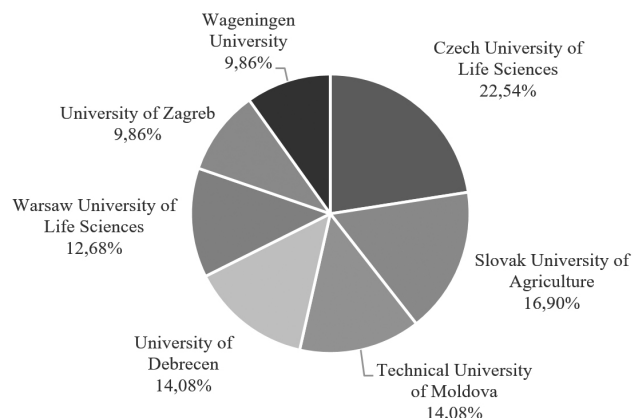
Source: own study

Figure 3.3. Field of expertise of respondents



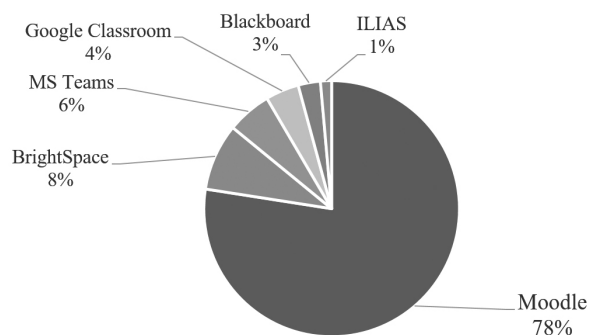
Source: own study

Figure 3.1. Structure of participants according to institution they represent



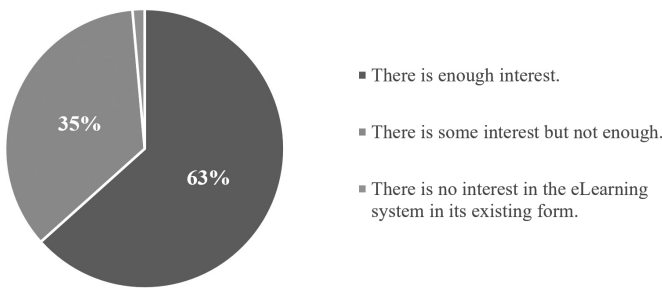
Source: own study

Figure 3.4. Name of the eLearning platform what the respondents use on their University



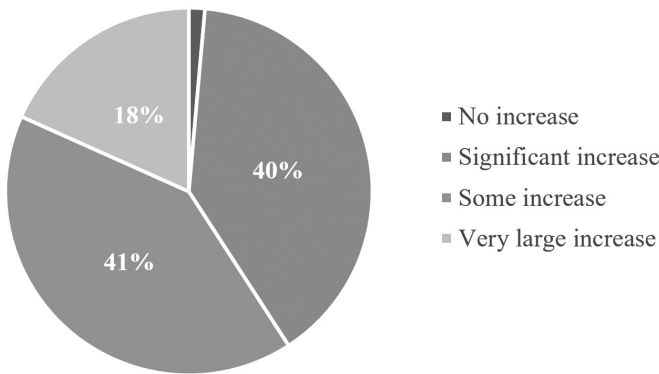
Source: own study

Figure 3.5. Interest in the eLearning system at the Universities in the existing form



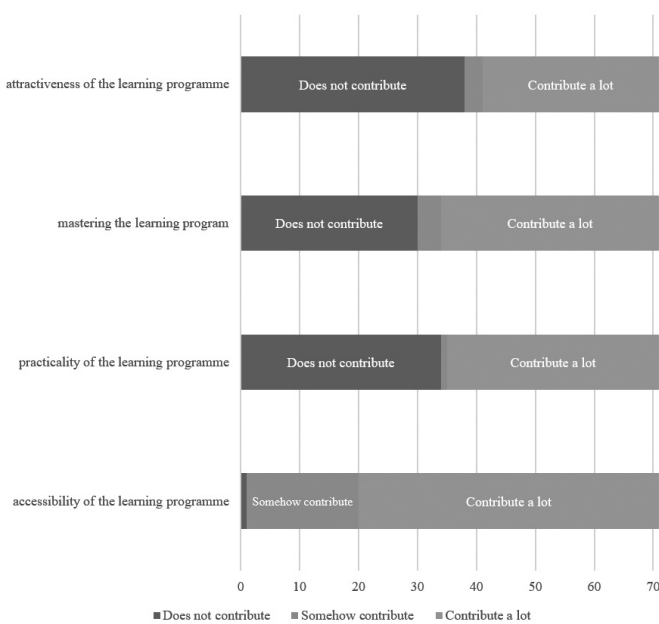
Source: own study

Figure 3.6. Are e-Learning system increases teaching or learning programme attractiveness?



Source: own study

Figure 3.7. How do you think the e-Learning platform contributes to the...



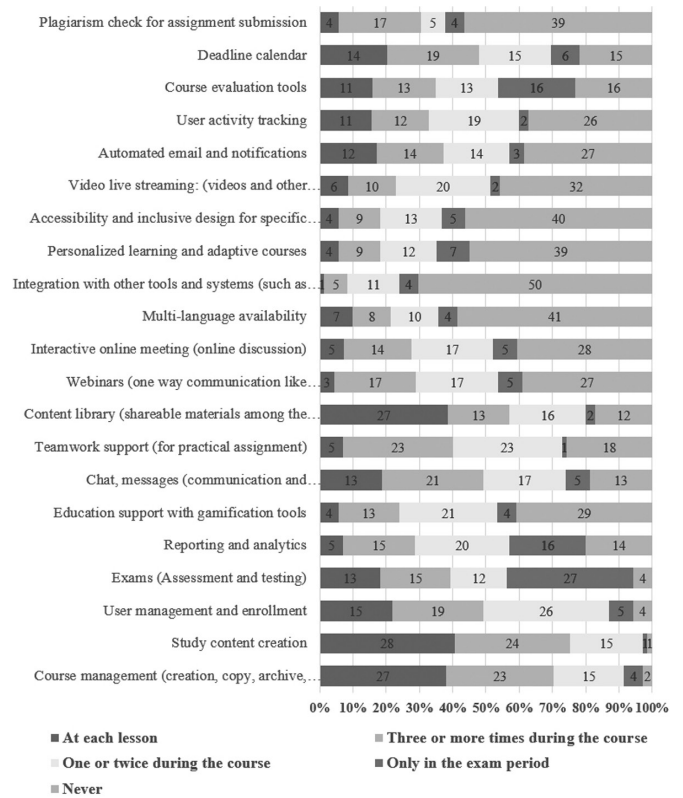
Source: own study

One of the reasons for the expansion of the use of e-learning systems can be found in the answers to the question about the impact of their use on the attractiveness of the curriculum. Namely, 58% of respondents believe that teaching with the help of e-learning systems significantly or very strongly increases the attractiveness of the teaching or learning program. On the other hand, only one answer is that online technology does not increase the attractiveness of the program (Figure 3.6).

According to the results of this survey, online platforms contribute the most to the availability of teaching programs and materials. The contribution to the attractiveness of the program was rated somewhat lower, followed by the contribution to practicality and the contribution to mastering the learning program (Figure 3.7).

In order to better assess how much and in what way e-learning systems are used, we asked survey participants to select how often they use a particular function or tool in the teaching period on a scale from 1 = For every lesson to 5 = Never. Of the 21 functionalities offered, respondents most often chose use functions: study content creation, course management and content library. On the other hand, most respondents never use functions: integration with other systems, multilanguage utility, plagiarism checking, accessibility to people with disabilities and personalized learning. Among the other functionalities, the following are mentioned as relatively frequently used functions: user management, calendar, knowledge assessment, chat and messaging, automated emailing, course evaluation tools, and user activity tracking (Figure 3.8).

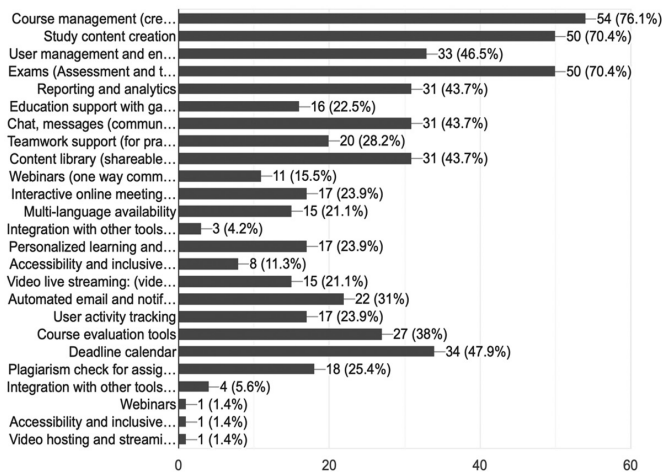
Figure 3.8. How often do you USE certain function of the e-Learning system at an average course?



Source: own study

According to the number of times they have been chosen (f), the most likable function of the learning platform is related to the course management (76% of respondents) (Figure 3.9). The study content creation and assessment and testing functions were mentioned almost equally many times (each 70%). The following are functions with more than 30 mentions: deadline calendar, reporting and analytics, chat and messaging, and content library. The least mentioned as preferred functions mainly correspond to those which are also most rarely used, namely: integration with other systems, webinars, accessibility for inclusion, video hosting and streaming.

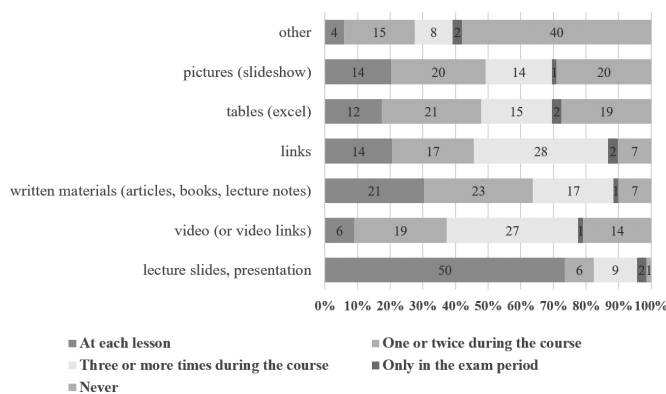
Figure 3.9. E-learning function popularity among respondents



Source: own study

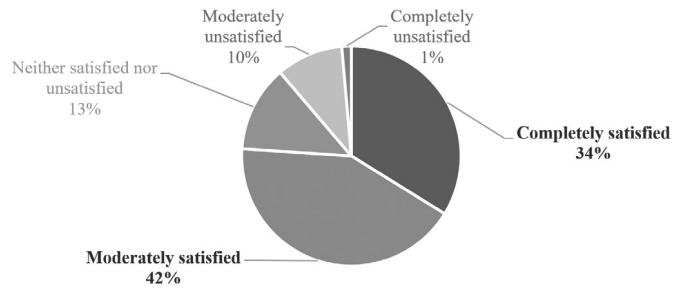
Placing materials on the e-learning platform and making them available to students is one of the main functions of the system. For this reason, we asked respondents to give us information on how often they upload these materials during the semester. The answers offered were: “at each lesson”, “3 or more times during the course”, “1-2 times during the course, only in the exam period”, and “never”. The most common is the upload of lectures or slides, and most of them at each lesson (Figure 3.10). Written materials and links are often uploaded, followed by videos, pictures and tables, which, however, many respondents never upload.

Figure 3.10. E-learning upload material habits



Source: own study

Figure 3.11. Satisfaction with the e-learning platform that respondents use at their university



Source: own study

At the end of the survey, the respondents expressed their satisfaction with the e-learning system they are currently using. We measured satisfaction on a scale from ‘Completely unsatisfied’ to ‘Completely satisfied’. Only 1 respondent chose the answer completely unsatisfied, and 10% moderately unsatisfied (Figure 3.11). Out of 71 respondents, 42% of them are moderately satisfied with the existing system, and 34% are completely satisfied, while 13% of them chose a neutral attitude. Despite the relative majority of moderately satisfied and completely satisfied respondents, we still see that there is room for improving the system, which should be taken into account when creating an e-learning system for AGRIMBA.

SUMMARY- RECOMMENDATIONS FOR THE DESIGN OF THE IDEAL E-LEARNING SYSTEM

From our questionnaire on “the uses of university e-learning platforms”, in total 71 people from eight universities participated in the survey conducted online under the title the Online Questionnaire on the Uses of University E-learning Platforms. Most of the respondents were university teachers with experience in using e-learning systems from various fields of economics, business management and marketing. Currently, Moodle is the most common e-learning system at respondents’ institutions, but there are also examples of using other systems as well as combining different systems to improve functionality.

Most of the respondents agree that the interest in the e-learning system is high enough, although there is also a part of them who believe that it could be even greater. E-learning systems are popular because they contribute to the popularity of teaching or learning programs and enable easier administration and greater availability of them.

The most frequently used functionalities of the e-learning system are: study content creation, course management and content library, and the least frequently used are integration with other systems, multilanguage utility, plagiarism checking, accessibility to people with disabilities and personalized learning. Similarly, the most popular functionalities are course management, study content creation and assessment and testing. Respondents least liked the functions of integration with other systems, webinars, accessibility for inclusion, and video hosting and streaming.

Lectures or slides are most often uploaded to platforms, followed by written materials and links, then videos, pictures and tables. Judging by the answers received, the majority of respondents are either completely satisfied (34%) or moderately satisfied (42%) with the e-learning systems they are using now.

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- Large community: Moodle has a large and active community of users, which means that users can access support and resources, and share knowledge and experiences.
- Wide range of features: Moodle offers a wide range of features, including course management, student tracking, assessment, collaboration tools, and more.

Weak points:

- Complexity: Moodle can be complex to set up and use, especially for those who are not familiar with the platform or with technology in general.
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- Performance issues: Moodle can experience performance issues, particularly when used by a large number of users or when used for large courses with many resources and activities.
- Lack of integrated mobile app: Moodle does not have an integrated mobile app, which means that users have to access the platform through a mobile browser.

Based on all of the above and the expressed level of satisfaction, we can conclude and recommend that the e-learning system and design that is currently most often used represents (MOODLE based system) a very good base for the development of a quality system for AGRIMBA.

Final summary about how to handle the weak points of moodle in this research:

- Complexity issue: We will install only the necessary apps we need and we will simplify the their management.
- Limited reporting capabilities: It is more than enough for this organization size.
- Customization can be difficult: We have enough experience to do the necessary customisation and demands to change the themes and other customizations won't come up so frequently.

- Performance issues: This system will be used approximately 50-60 users parallel, and we have a brand-new server with very good internet connection. These issues come up only at extra loading
- Lack of integrated mobile app: We don't need mobile app.

To summarize the above list of weaknesses the answer is that we can handle them and they will not have any bad impact on the developing project.

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