CZECH UNIVERSITY OF LIFE SCIENCES PRAGUE

Faculty of Economics and Management

System Engineering and Informatics

Bachelor Thesis

Learning management systems: the case study for higher education institution in Uzbekistan

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BACHELOR THESIS ASSIGNMENT

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Informatics

Thesis title

Learning management systems: the case study for a higher education institution in Uzbekistan

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Objectives of thesis

Main objective of this bachelor thesis is to propose the implementation of an open source learning management system (LMS) for a selected higher education institution in Uzbekistan.
Partial goals of the thesis are such as:
- to make a literature review of the current state of the art of LMS and their usage among higher education institutions with a special focus to Uzbekistan;
- to analyse the current uptake of information systems and information technologies in the given institution;
- to select and propose implementation of an open source learning management system in the given institution.

Methodology

Methodology of the thesis is based on study and analysis of specialized information sources. For the proposal and selection, the key aspects of implementing open source software will be considered and explained. Selection of the LMS will be aided by Multiple Attribute Decision Making (MADM) methods such as Scoring and Sequence methods. In the thesis, the scientific methods such as analysis, synthesis, comparison, induction and deduction will be used. Based on the synthesis of theoretical knowledge and the results of own solution, the conclusions of the thesis will be formulated.

The proposed extent of the thesis

30 – 40 pages

Keywords

Moodle, e-learning, open source, learning management system, LMS, CMS, Education, IS, IT.

Recommended information sources

BAMBER, Veronica. Enhancing learning, teaching, assessment and curriculum in higher education: theory, cases, practices. Maidenhead: McGraw-Hill, 2009. ISBN 978-0-335-23375-5.

GOSPER, Maree a Dirk IFENTHALER, ed. Curriculum models for the 21st century: using learning technologies in higher education. New York: Springer, c2014. ISBN 978-1-4614-7365-7.

SECKER, Jane. Copyright and e-learning: a guide for practitioners. London: Facet Publishing, c2010. ISBN 978-1-85604-665-7.

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Prague on 27. 11. 2019

Declaration

I declare that I have worked on my bachelor thesis titled "Learning management systems the case study for higher education institution in Uzbekistan ” by myself and I have used only the sources mentioned at the end of the thesis. As the author of the bachelor thesis, I declare that the thesis does not break copyrights of any third person.

In Prague, on November 29th of 2019 _____

Acknowledgment

Firstly, I would like to thank and acknowledge my thesis supervisor Ing. Milos Ulman, Ph.D. for his valuable contribution, guidance, suggestions and friendly co-operation during my thesis completion.

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Learning management system: Case of Uzbekistan

Summary

This bachelor thesis deals with widely used LMS frameworks in the world.

The main objective of the thesis is to recommend the best ideal variant to a higher education institution in case country, based on analysis of chosen frameworks. “The Partial goal is to analyses the LMS frameworks. The theoretical part contains main characteristics of LMSs and their principles, the common approaches and methodology is to propose an LMS option as an analyst point of view. The Practical part consists of two sections: In the first section, the author analyzed four top ideal variants based LMS frameworks. Also, choosing individual LMS framework author finalized criteria’s at the beginning of the practical part. In the second section of the practical part, the author found out the best frameworks between them and recommended an ideal variant of LMSs to be implemented in the region of the case country which is situated in Central Asia. The Author’s work is on the desk of the rector of Namangan State University to be approved and implanted to an Institution which includes 6000 + students and more than 500 staff.

Keywords:

Moodle, e-learning, open source, learning management system, LMS, CMS, Education, IS, IT.

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1 Introduction

The use of Laptops and the Internet has produced the technological conditions for Instructors and students can take advantage from the diversity of online information, communication, collaboration and sharing with others. But unfortunately, in Uzbekistan LMS is lacking to be developed and used as a side effect, students are out of knowledge about what is e-learning or its priceless benefits. The integration of Internet services in the teaching practices can be responsible for thematic, social and digital improvement for the agents involved. There are many benefits when we use a Learning Management Systems (LMS) such as Moodle, E-Front, Classroom, Sakai and so on to support the lectures in higher education. In general components of learning management systems contain synchronous communication tools, management, features, and assessment utilities. (listedtech, 2015)

Furthermore, Technologies and their use have made big changes in education, since it is changing its paradigms, from a closed model, and teacher-centered classroom to a model more open and student-centered, where the teacher moves from one holder of knowledge for a learning mentor, able to manage diverse discourses and performs as well as stimulate the intellectual capacities of students in the treatment of information and include online learning, hybrid learning and collaborative models. Some authors (Martin, Parker, & Deale 2015) are of the opinion that a number of the characteristics of online education have their roots in distance education and there are four types of interaction: student–content, student–instructor, student–student and student–interface.

Amongst the main features of e-learning platforms we can refer to the flexibility, accessibility, focusing on the student, the economy or rationalization of resources, interactivity and enhancement of the student. The courses that are developed on the web have the advantage of providing the content for students anywhere in the world, faster than the other conventional methods.

These assessment utilities allow lecturers to systematize basic assessment tasks. Assessments can be straightaway delivered to the student, and upon conclusion, immediately returned with grades and detailed feedback. Therefore, learning management systems can also be used for assessment purposes at Higher Education in Uzbekistan in order to save time and afford. For such crucial reasons Author decided to research about LMS: in Uzbekistan

2 Thesis objectives and methodology

2.1 Objectives

Main objective of this bachelor thesis is to propose the implementation of an open source learning management system (LMS) for a selected higher education institution in Uzbekistan. Partial goals would be to make a literature review of the current state of the art of analysis of LMS and their usage among higher education institutions with a special focus to Uzbekistan. In addition, analyze the current uptake of information systems and information technologies in the given institution and select and propose implementation of an open source learning management system in the given institution.

2.2 Methodology

Methodology of the thesis is based on study and analysis of specialized information sources. For the proposal and selection, the key aspects of implementing open source software will be considered and explained. Selection of the LMS will be aided by Multiple Attribute Decision Making (MADM) methods such as Scoring and Sequence methods. In the thesis, the scientific methods such as analysis, synthesis, comparison, induction and deduction will be used. Based on the synthesis of theoretical knowledge and the results of own solution, the conclusions of the thesis will be formulated.

3 Literature Review

3.1 *Introduction to the case country: UZBEKISTAN*

The Uzbekistan National Education System is divided into following levels

(UZBEKISTAN, 2019)

- Pre-school education
- General secondary education
- Vocational secondary education
- Higher education
- Post-graduate education.

From 1994, the universities of Uzbekistan started a new type of admission practices. Now, it is based on testing system of ‘’National Testing Center’’. Therefore, the entrants are required to pass the State Exams in order to be able to study in any educational organization According to Ministry of Education yearly quotas for admission to institutions of higher education are 62,907 and almost 56,607 of them for undergraduate programs (bachelor degree). Moreover, annual quotas for bachelor degree are divided into grant (scholarship by government) and contract (self-finance) and the total quotas are not changed (no increase in last four years). The number of applicants to the higher education is rising year by year, but the quotas for admission are not changing, where annual quotas are 34% for the grant and 66% for the contract, accordingly. In addition, the growth rate of applicants to bachelor degree is increasing approximately 13.41% per annum. (UZBEKISTAN, 2019)

The following section of the report includes an analysis of the education system of Uzbekistan and it covers detailed information about target segment demographics, education system, problems and challenges of education system, and an analysis of the behavior of target segment population and existing online and traditional education service providers of the particular market segment. This chapter will be concluded with the analysis of market needs of online education business.

3.2 Analysis of the population & internet users from Statistics center of Uzbekistan

The population of Uzbekistan is more than 33 million, and it is growing by 0.94%, where urban population is 44%and rural population is56%. Target population is students of Academic Lyceums and Vocational Colleges and applicants, who are preparing for SEUU. Moreover, Target population age varies from 16 to 26; 22.8 percent of whole population (State Committee of Statistics , 2019).

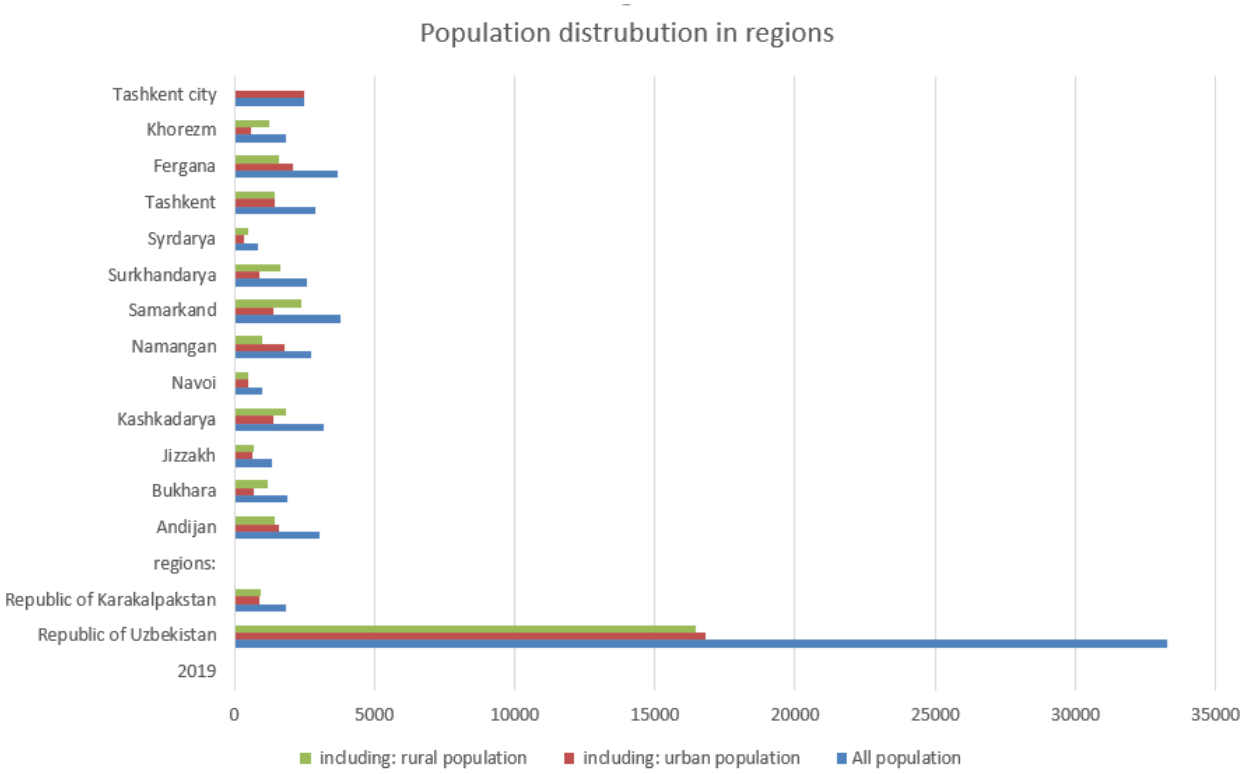


Figure 1 (Uzbekistan, 2019)

According to the State Ministry of ICT (2014) Internet users' percentage is 42% and 32% of them PC internet users, the rest are mobile internet users. In addition, 16% of households, whose monthly income is $160 or less, cannot afford online education services

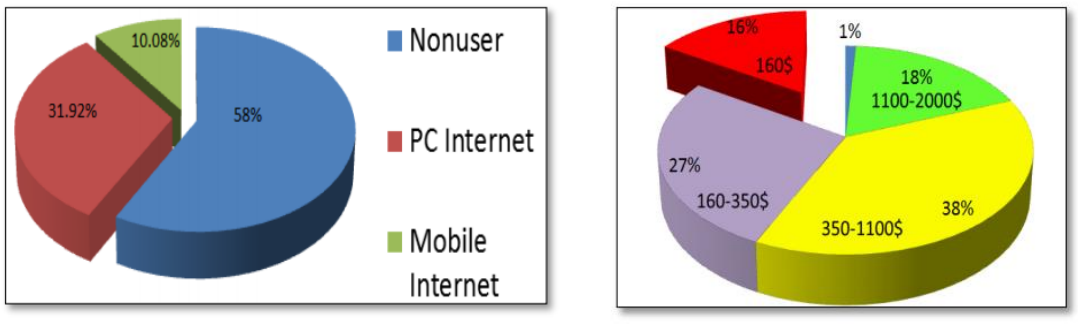


Figure 2 (Uzbekistan, 2019)

3.3 Asia-Pacific Learning Management Systems Market Overview:

Learning management systems (LMS) are software applications/tools designed to develop, manage, and deliver learning & training modules and services to academic and corporate users through electronic media. The Asia-Pacific learning management systems market size is expected to generate $2,884 million by 2022, growing at a CAGR of 34.2%. (Market, 2018) The LMS market in Asia-Pacific is influenced by several drivers, restraints, and opportunities. Growth in adoption of e-learning and inclination towards "on-the-go learning practices" drive the LMS market. However, lack of e-learning infrastructure, and cultural barriers hinder the market growth. Numerous educational institutions in developing economies have been unsuccessful in adopting these technologies, owing to insufficient funds and lack of skilled workforce. However, economic progress in developing countries and improvement in educational facilities are expected to generate growth opportunities in the near future.

3.4 Top Factors Impacting APAC Learning Management Systems Market

3.4.1 Growth in adoption of e-learning

Significant investments in IT infrastructure and rise in preference for digital learning, due to its several advantages, have led to wide adoption of LMS in academic and business learning/training programs across Asia-Pacific. In addition, the education industry, in these countries, has witnessed rapid growth, and is anticipated to continue the trend in the future. At present, a large number of online education companies are entering in the market, which has significantly increased the growth of the LMS market in the Asia-Pacific region. For instance, online education companies operating in China have increased from 100 in 2012 to over 8,000 in 2016.

3.4.2 China learning management software market

China accounts for the highest percentage of LMS market share. However, the penetration level of LMS is lower as compared to developed countries such as Australia and Japan. However, in the last few years, the market has witnessed attractive growth as both large and medium sized organizations have adopted this electronic educational technology. Moreover, change in traditional education system and increase in number of start-ups in the e-learning industry have encouraged the market growth. For instance, in 2013, Oracle introduced “Oracle Learn Cloud 13A” with advanced training management and delivery features.

Learning management system market expected to flourish in Asia Pacific

The Asia Pacific region comprises of several developing countries such as China, Japan, South Korea, and India are witnessing increasing penetration coupled with decreasing internet rates subsequently driving the growth of LMS market in APAC. Rapid population growth and increasing urbanization has created a demand for better education in the region. This is further supported by governments of several economies that are focused on enhancing their education system by supporting the growth of technology in the education sector by providing funds for development of literacy in rural areas says (MarketWatch, 2019)

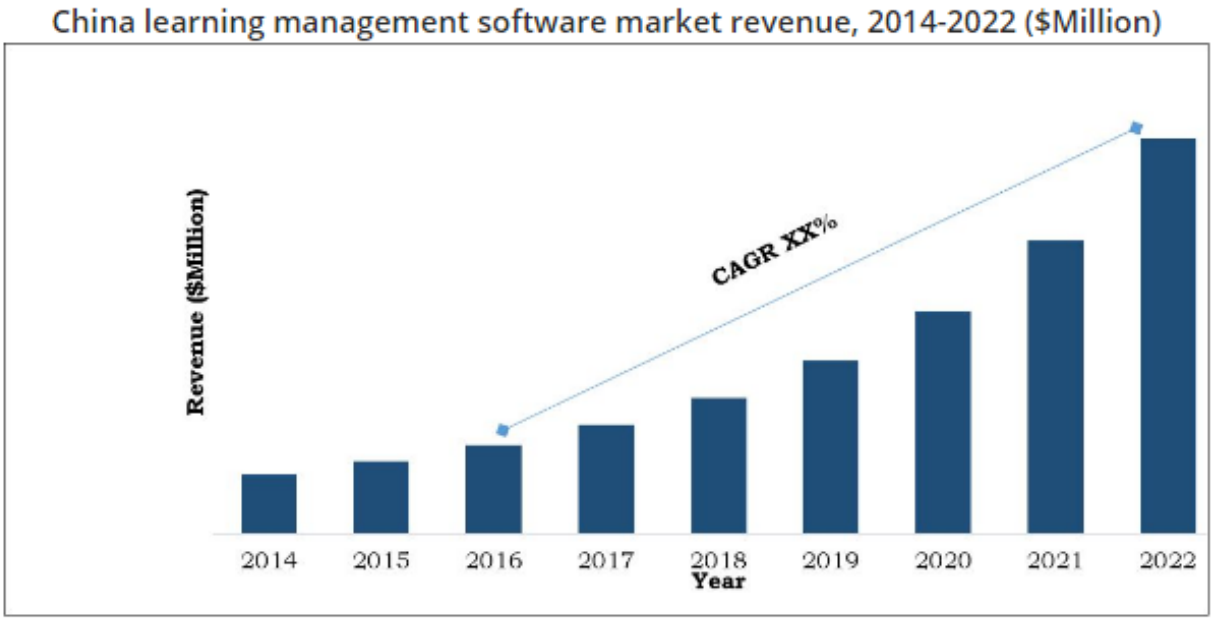


Figure 3(Market, 2018)

3.5 Analyses of open source LMSs

In below sections author will focus on LMSs which are wide spread in Uzbekistan such as Moodle, Sakai, E-Front and its redesigned system called my e-study by local University of Information Technologies in Tashkent (see Figure 10)

3.5.1 Moodle

Moodle is a powerful educational software package that provides online learning and online lessons. There are training modules available in the system: Forums, Materials, Messenger, Chat, Exercises, Group work, Student tracking and many more.

Like other LMS, it supports IMS, SCORM and other standards. Analyzes show that the software package, which has the most add-ons and modules compared to other LMS systems, is exactly the Moodle software package. Currently distance learning in educational institutions around the world is organized using the same software as Moodle.

The Moodle platform has three levels of use, with features of differential use and access. So is the concept of trustee or administrator (the manager of the platform), teacher (who may also have other designations, for example, trainer, facilitator, promoter) and the student (learner, participant, among others). These roles and their features are represented in the below sections. Moodle has a set of entertainment activities available such as: Chat, Database, Forums, Glossary, Questionnaire, Scheduler, Lesson, Hot Potatoes, Assignments, Uploading of Files, Online Text, Upload of Single File, Online Activity, Quiz, Wiki, Workshop, Scorm.

Top 10 from 229 countries by registrations

Country	Registered sites
United States	9,120
Spain	8,834
Mexico	5,606
Brazil	4,359
Germany	3,832
United Kingdom	3,343
Italy	2,940
Russian Federation	2,841
France	2,644
Colombia	2,564

Figure 4 (Moodle, 2019)

3..5.2 E-Front in Details

E-Front is a software package that supports Unix, Linux, FreeBSD, Windows, Mac OS X, Netware and other PHP operating systems. MySQL and PostgreSQL can be used as a database. Like other LMS, IMS and SCORM support standards. The system is translated into over 30 languages, including Uzbek translation. If you visit a site, you will be offered several versions of E-Front, including Editions, Enterprise, Educational and Open Sourcing. (For more information on how these differ from each other, please visit the following link: http://www.efrontlearning.net/functionality-matrix) Do you want to use only the latest open source? You can buy it for an extra fee. However, the Open-source version of the E-Front software package is enough to organize the distance learning process. The stable version at the time of writing the training module is E-Front (Open-source) v3.6.13.2.

Technical and program requirements for the organization of distance learning in educational institutions.

The scientific and pedagogical requirements for the organization of distance learning (MT) are described in many publications. The literature review shows that the technical and program requirements for the organization of distance learning are not fully explained. The MT process can be performed in the following steps: (com, 2019)

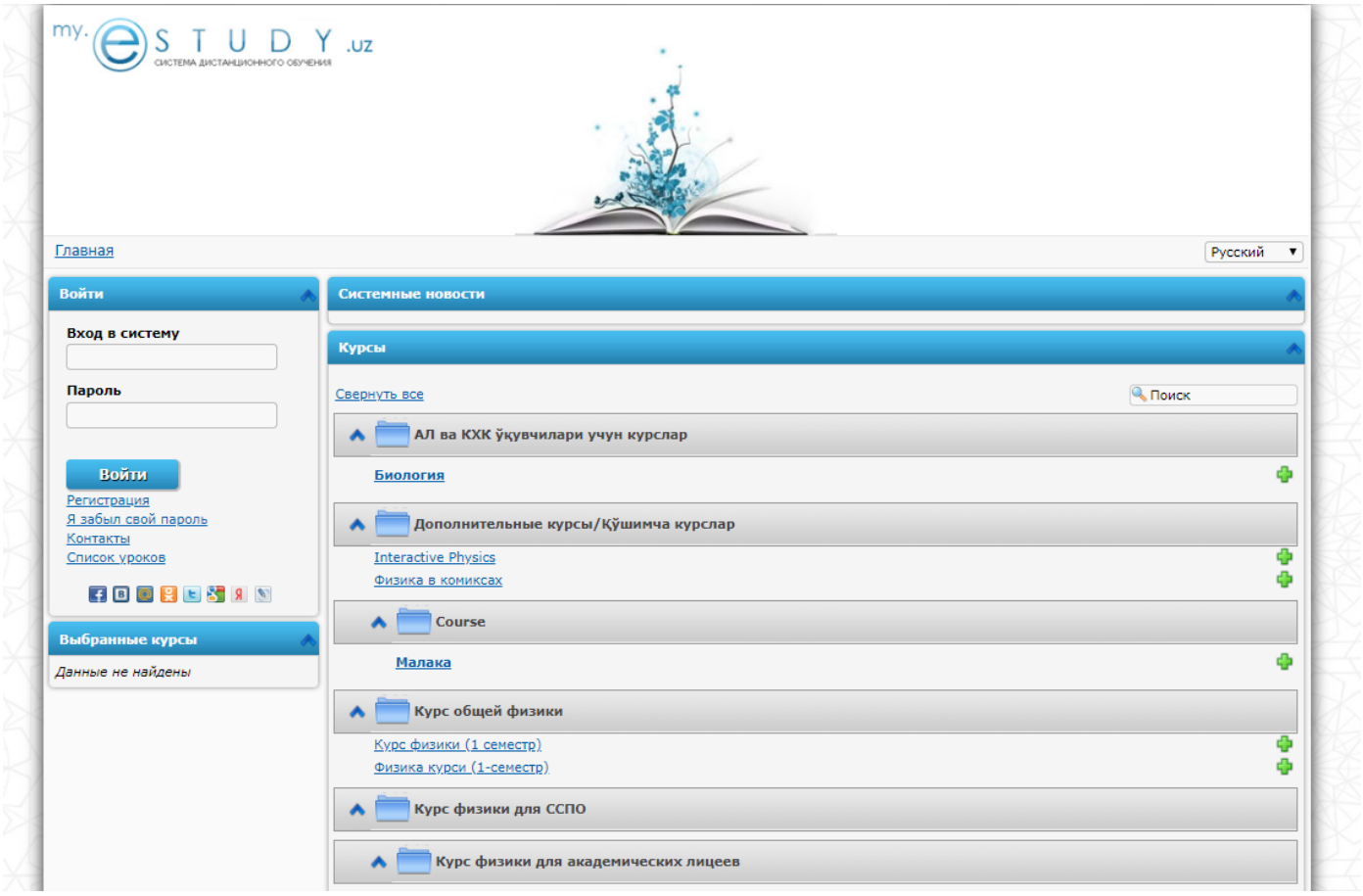


Figure 5 Structure of the LMS system my.estudy.uz close to the base of the E-Front software complex

The e-learning courses at http://my.estudy.uz have been created by physics department at the Department of Physics of the Tashkent University of Information Technology and are still operating based on the E-Front software package. The system's official website is http://www.efrontlearning.net

Furthermore, At present, the Department of Physics of TUIT (Tashkent University of Information Technology) has created a system of Estudy.uz (beta version), which provides distance learning physics. The system is different from the above systems, which is currently being tested.

3.5.2 E-Front main features

Course creation	User Authentication	User Accounts	System Reports
Built in authoring tool	Self-registration	Browse list of users	Live logs
Changing course default settings	Manual accounts	Bulk user actions	Email notification settings
Upload courses	Custom user log in page	Add a new user	Automated email reports in predefined intervals
Can reuse PPTs, PDFs, Videos	Sample2/API integration	Custom/Mandatory user profile fields	Custom reports generator
Consume online video content	Active directory/LDAP integration	Upload users	Support for offline access to content

Figure 6 Author made Fig

3.6 Sakai

Sakai is the next open source GNU GPL software package widely used in many educational institutions around the world. Unlike other LMS systems, the system is fully Java. Therefore, the system is cross-platform. The Sakai software package has its own database and can use the system's internal database, if the number of users is low. It can work in MySQL or Oracle databases if there are many users. While writing the training module, the stable version of the system is Sakai 2.9.2. The Sakai software package has the following general modules that allow you to manage your educational process:

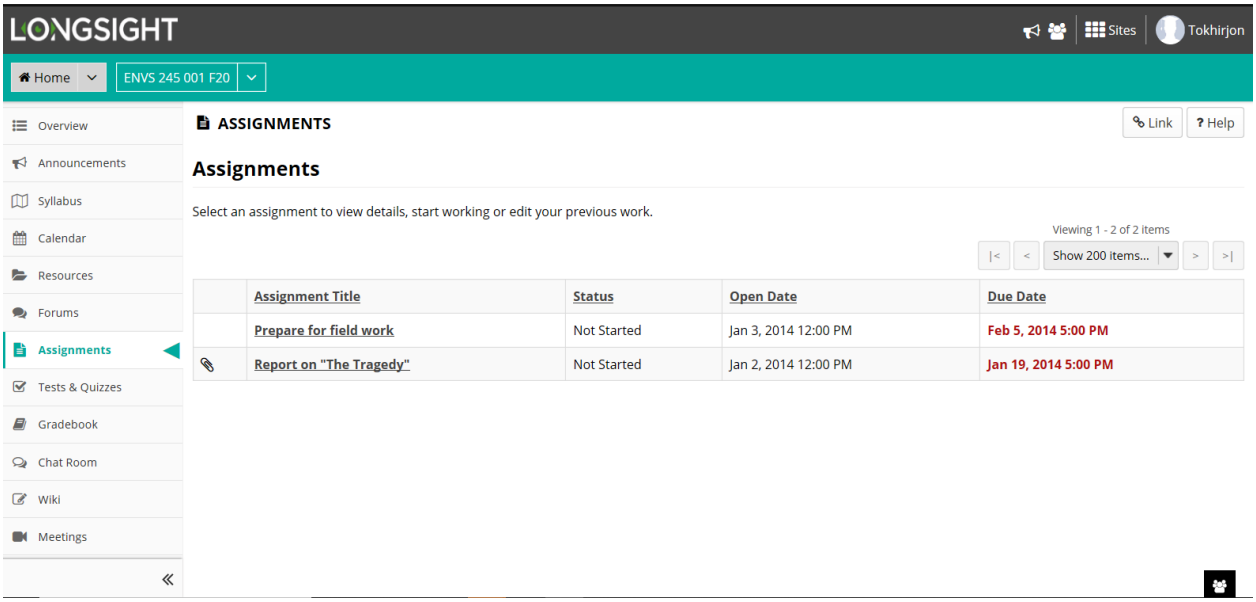


Figure 7 *Sakai Demo test view as an user role.*(Sakai, 2019)

3.6.1 Sakai's main features

• Announcements (Announcements) - serve to deliver announcements to system users;

• Drop Box - Provides document (or private) document exchange between students / teachers and students / teachers;

• Email Archive - this module allows the system's users to send e-mail messages to the system archive mail;

• Resources - the ability of users within the system to store and publish their learning resources to the community;

• Chat Room - an on-line communication environment among users;

• Forums - Open discussions on any topic. Unlike chat in on-line communication, this module can analyze problem situations offline;

• Message Center - Instant messaging module between system users;

• News / RSS - Ability to export RSS feeds to the PC;

• Poll tool - the ability to run various queries within the system;

Presentation - a module that allows multiple users to submit files at the same time;

• Profile / Roster - Module for handling user profiles of existing users in the system;

• Repository Search - a system within the system.

Sakai Scorecard Summary

Implementation	Support	Usability	Likelihood to renew	Likelihood to recommend
27%	27%	20%	5%	21%

Figure 8 Author made chart

Teaching tools include: Assignments, Grade Book, Module Editor, KTI Authoring, KTI Assessment, Section Management, Syllabus. The System Worksheets (Portfolio tools) are: Forms, Evaluations, Glossary, Matrices, Layouts, Templates, Reports, Wizards, Search, Web Content, WebDAV, Wiki, Site Setup, MySakai, Widgets.

3.8 Google for Education: Classroom

Classroom is a free service for schools, non-profits, and anyone with a personal Google account. Classroom makes it easy for learners and instructors to connect—inside and outside of schools. Classroom saves time and paper, and makes it easy to create classes, distribute assignments, communicate, and stay organized.

There are many benefits to using Classroom:

• Easy to set up – Teachers can add students directly or share a code with their class to join. It takes just minutes to set up.

• Saves time – The simple, paperless assignment workflow allows teachers to create, review and mark assignments quickly, all in one place.

• Improves organization – Students can see all of their assignments on an assignments page, and all class materials (e.g., documents, photos, and videos) are automatically filed into folders in Google Drive.

• Enhances communication – Classroom allows teachers to send announcements and start class discussions instantly. Students can share resources with each other or provide answers to questions on the stream.

• Affordable and secure – Like the rest of G Suite for Education services, Classroom contains no ads, never uses your content or student data for advertising purposes, and is free.

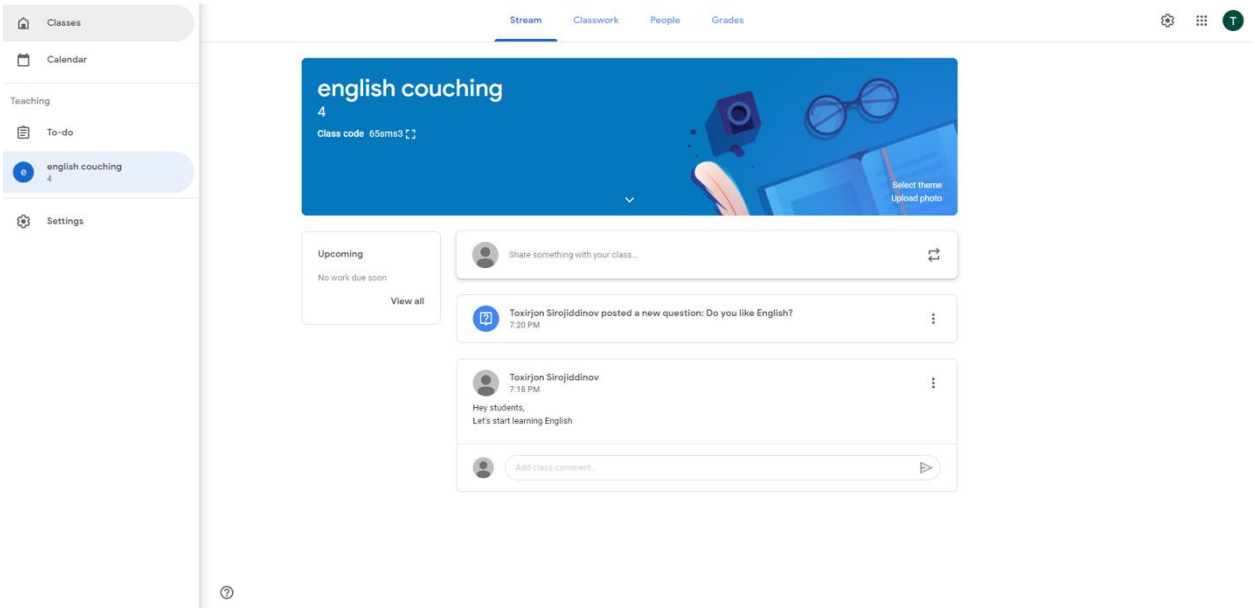
Permissions Notice:

Camera: It is needed to allow the user to take photos or videos and upload them to the Classroom.

Storage: This would allow the user to attach photos, videos, and local files to Classroom. That would be mandatory to enable offline support.

Accounts: To have one is crucial to allow the user to choose which account to use in Classroom. (APKMirror, 2014-2019)

Google Classroom as a tutor role.



(Classroom, 2019)

4 Practical Part

First is having an overview of implementation the LMS in any institutions as per widely used methods with crucial steps. Which are as per following. Interview with the IT department of the institution to have a survey before implementation. Furthermore, introduction to the case Institution to have some brief information about it and it's competence.

Second is user requirements analysis to address the needs for proper LMS. And this is the classic way of learning the end users what they demand for.

Third thing is having a survey what LMS options are being discussed in the case country nowadays, or being targeted for future. Author will give brief details on this section what would be right choice for the proposed case country.

The last but not the least is assessment of options with the help of MADM method. This section would be ideal one to have a real time view of the whole match between LMS options.

4.1 Steps to implement

As author mentioned above there are crucial steps to have a look before getting into deep.

- Stage 1: Analysis
- Stage 2: Design
- Stage 3: Implementation
- Stage 4: Creating Learning Content
- Stage 5: Launch
- Stage 6: Development

Phase 1. Analyzes the needs of the educational institution for distance learning, the number of users involved in the learning process, methods and forms of training, technical, software and human resources needed to implement the project, and the economic feasibility of the project. is done.

Phase 2. Will design the scope and terms of reference for the analysis.

Phase 3. the software for controlling the selected e-learning process will be installed on the appropriate server and the system-specific domain will be selected. There will be training sessions on the use of e-learning software and training of technical support staff.

Phase 4. A key element of the e-learning process, is that curriculum is created in partnership with the education department and industry experts. The content created by the field professionals will be checked by the experts.

Phase 5. The e-learning process will be launched. The learning process is under constant control. System security measures will be monitored.

Phase 6. Will address the shortcomings in the steps mentioned above, create new training courses, expand technical capabilities, and work on system development.

4.2 Quick overview of the target Institution as per case country.

Namangan State University (NamSU) is the largest among the three higher education institutions in Namangan province, the province which has almost 2 million population with 7900 km2 area located in eastern part of Uzbekistan. It was established in 1942 as a pedagogical institute. Nowadays the university has 6306 students of bachelor's degree and about 200 students of master's degree levels. It has 560 teaching staff which is 36 % of them have PhD and Doctoral levels. NamSU offers various courses of study, including 23 bachelors educational programs, 11 masters specialization programs, 10 programs for PhD. These programs are in Languages (Uzbek, Russian, English, and German), Literature, Social sciences, Law, Political sciences, History, Archive studies, Pedagogy, Psychology, Early childhood education, Preschool education, Sport, Applied art, Geography Sciences, Economy, Applied Mathematics, Physics, Chemistry, Technical Sciences, and etc. Today the university has academic relationships with more than 100 advanced universities in Europe, USA, Asia and CIS countries. Every year the teaching staff and students attend different scientific events and spend academic visits in advanced universities in developed countries. NamSU has links with several EU and Asian universities such as Oslo and Akershus University College of Applied Sciences (Norway), Stokholm university (Sweden), Hochschule für Technik und Wirtschaft Dresden (Germany), Magdeburg university (Germany), Varna Technical University (Bulgaria), Holon technological Institute (Israel), Incheon University (South Korea), Malaya University (Malaysia. Our relationship consists of student and teaching staff exchanges, teacher training, knowledge transfer, scientific and academic collaboration. Department of German Language has active collaboration within the DAAD program of Germany and good links with Goethe Institute. (universiteti, 2019)

4.3 Interview between officials and Author at NamSU

Topics included:

1. Current case of LMS and university competence for it.
2. Survey regarding implementation of the LMS at NamSU university
3. User Requirements as per Poll made among students.
4. Issues to be resolved.
5. Deadline for the project completion for both sides conveniences

According to the head of IT department at NamSU Ing. Mr. Sherali Jo'rayev:

"We want to do a lot in this regard and we are ready to move forward with the present offers. But I want to stop by in details what has been done and being done in our university at the moment. As the learning management system is on demand today, we have done a lot to do needful work on this topic, particularly we have made webpage of Moodle for future purposes.
And also we are ready to have any opportunities to develop our online learning management system especially with the platform called Moodle".

Wise dean Mr. PhD Dekhkanov said that "cost savings is not the key to choose an LMS advantage, but it is rather access to various innovative tools that interface with our own developed platform. And what we do in this regard should be the solution to the whole generation, not just today or tomorrow. So we need to analyze it carefully and make a clear decision, and I hope this news will surely come to the hearts of students".

In accordance with Ing. Mr. Jo'rayev the best option would be Moodle since the institution has already made web page and some researches on it but that did not finalize yet. Because of that reason author is going to have more closer look on the requirements from user end and the capacity of the University.

As per taken survey by author Nowadays the university has 6306 students of bachelor's degree and about 200 students of master's degree levels. It has 560 teaching staff which is 36 % of them have PhD and Doctoral levels. The style of teaching and studying is still remaining in an old classic way. The bandwidth of the network is not that much ideal but still manageable. Below is all detailed info regarding the competence of the University.

4.4 The result of survey before implementation

1. **University Capacity:** 6306 students of bachelor's degree, 250 students of master's degree and 82 PhD students, 560 teaching stuff which is 36% of them PhD and Doctoral levels.
2. **Decision making:** With special request to Rector
3. **Internet speed:** 7 Mbps download and 11 Mbps upload.
4. **Electricity:** Not stable.
5. **Internet users mobile:** 85% of all members of the University.
6. **Internet users PC:** 32% of all members of the University.
7. **Server owns:** Yes
8. **Public Wi-Fi availability:** No
9. **Network availability:** Only university library with wired connection
10. **IT Infrastructure is managed by:** Professors and teachers.

(universiteti, 2019)

4.5 Deadline for the project completion for both sides conveniences

As per agreement with IT representative and wise dean deadline is agreed to be done by end of 2020. Project completion depends on how fast the issues will get resolved also another point to be seen that most of the decisions are depends on the Rector and Ministry of Higher and Secondary Specialized Education not Wise dean which makes the process more slower than expected.

Criteria chosen by the head of IT department Mr. Jo'rayev and Wise Dean Mr. Dekhkanov

1. Common in Uzbekistan
2. Widely used worldwide
3. Lower total cost for ownership
4. Languages included: Uzbek, Russian, English, Turkish, Kazakh
5. With mobile application included Android & IOS operating systems
6. Training needs to be included but not limited
7. Compatible for Lower Internet speed limit
8. Higher levels of security
9. Integration compatibility to fully customize

Issues to be resolved

As it is seen from the above mentioned survey results and the user requirements some issues which are on site needs to get resolved before implementation.

Such as:

Internet speed, public Internet access, UPS availability for users conveniences, more powerful PCs, advanced study rooms stuffed with new technologies.

4.6 Multiple Attribute Decision Making to have a right choice

After having a meeting among the officials of Namangan State University such as head of IT department, Wise dean of Social and Economic Faculty, Financial assistant of the University and Author they have faced multiple options to choose. So according to chosen Criteria by IT Head and Wise dean, Author evaluated of all alternatives with respect to attributes, which are summarized in the following MADM model with finite number of alternatives approach just to achieve an ideal and successful completion of the project.

Author explanation regarding Multi Attribute Decision Making (MADM)

MADM refers to an approach of problem solving. This is employed to solve problem involving selection from among a finite number of alternatives. An MADM method is a procedure that specifies how attributes information is to be processed in order to arrive at a choice. And now in our samples we can use 2 methods such as: Scoring and Sequence methods.

Table ( ) Systems evaluation via MADM Scoring method, by author
Using Scoring method (Scale 1 - 10)

Systems	Price	Common in UZB	Worldwide usage	Language supported	Integration	Training	List of features	SUM
Moodle	6	9	10	9	9	9	10	62
Sakai	9	4	9	7	8	8	10	55
E-Front	8	6	5	5	8	9	8	49
Classroom	10	3	7	8	6	5	6	45

Scoring method prefers the alternative which has the highest score. The compromising methods rely on the ideal best and ideal worst solutions obtained from the available alternatives. According to the theory lets approach the problem more closer. As we see Moodle got highest point as per evaluation. On the other hand Classroom got the lowest and is considered nadir alternative platform among others as per scoring method.

Now let author do sequence method of evaluation and it can be decided to choose which one is the most ideal overall.

Table ( ) Systems evaluation via MADM Sequence method, by author

Using Sequence method (4 is the best)

Systems	Price	Common in UZB	Worldwide Usage	Languages supported	Integration	Training	List of features	SUM
Moodle	2	4	4	4	4	4	4	26
Sakai	4	1	4	3	3	3	4	22
E-Front	4	3	2	2	3	3	3	20
Classroom	4	1	3	3	3	2	3	19

As per the table above Moodle having less sequence in terms of the attribute called ‘Price’ on the other hand Classroom which got least SUM has the better rank as the price is highest. However at the end Moodle is left as winner since its SUM is higher than others.

As it is seen from both tests the result is kept as Moodle more beneficial and classroom is less effective and inefficient in terms of attributes chosen by NamSU University. This also taken into consideration in Results and Discussion section below

5 Results and Discussions

In the previous part we have analyzed all chosen frameworks and we have decided to choose the best alternative and nadir alternative from the competitors. By evaluation with MADM model, I chose Google Classroom as a nadir alternative because of its popularity, functionality, and inefficiency.

Author decided to choose and use in his projects Moodle Learning Management System as the best, ideal alternative and Author preferred it than other competitors.

5.1 Moodle has the Priority

Main reasons are as following

- It is mainly concluded as a future LMS Model for case country.
- It is mainly used worldwide and most of the Asian countries.
- It is supporting local language and additional languages as per user requirements.
- Its integration is the best, one time buy and develop it as you wish.
- For the price training and support is guaranteed.
- It has most of the features which are compatible as per user requests.
- It is commonly and widely being proposed in case country (look at **figure 12**)
- Higher level of security.
- Peer review.
- Well-tested updates and plug-ins.
- Verity of capabilities and updates.
- Big community over the network to share any problems or knowledge transfer.

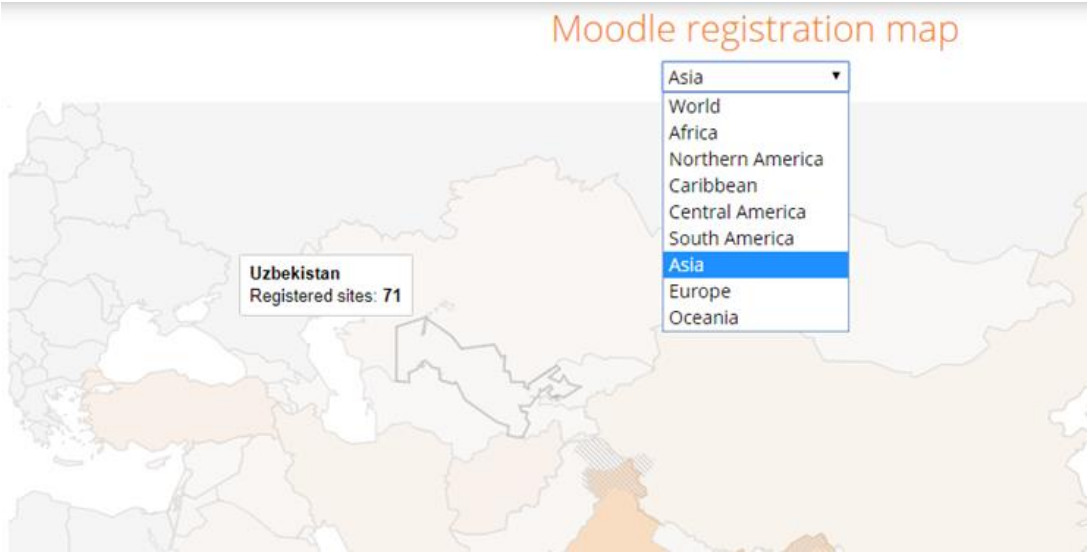


Figure 9 (Moodle, 2019)

One of the another reason to choose Moodle is:

Moodle is available in many languages than before, thereby perfectly increasing the reach of the LMS to education systems anywhere. Anyone (students and teachers alike), can choose to view a Moodle site in a different language simply by selecting the language from dropdown menu on the upper-right corner of the screen. For instance, if you select English, the interface of the site (menus, tabs, and other labels) will change into chosen language. Educators can easily enhance learning based on local preferences and more. Note however, Moodle does not interpret the content as itself. Any user generated content remains as in the language it was entered before.

On top of this, there are many educational institutions using Moodle, some on a very large scale. The best instance of a large Moodle implementation site is the Open Polytechnic in New Zealand. This institution has deployed Moodle across eleven polytechnics and three universities, along with several Government departments and a growing number of schools. In

2007, in recognition for its work in open source software development and collaboration, the Open Polytechnic of New Zealand won a prestigious $100,000 award from the United States-based Andrew W. Mellon Foundation.

As another example, the Open University has announced a $7,390,000 Open Learn initiative that offers 900 hours of e-Learning available on their new Moodle platform for over 180,000 students. Canada's Open University, Athabasca University, has switched to Moodle for developing an effective learning management system that serves over 30,000 users for eleven undergraduate and graduate courses. (Athabascau, 2019)

6 Conclusion

In a nut shell, current study shows that open source LMS became more popular e-Learning environment, even for famous big universities in the world. Uzbek educational institutions has a positive view of using LMS and it is recommended to use open source LMS following world's best practice. Also, this can be seen from the author made tests, analyses and reviews.

Main objective of this bachelor thesis is to propose the implementation of an open source learning management system (LMS) for a selected higher education institution in Uzbekistan. The objective is achieved by making researches and analyses and now it can be clearly seen what was the backlog and what was preventing the selected institution to deploy LMS. After all, it is decided to implement Moodle Learning Management System to NamSU (Namangan State University) by the end of 2020 as per discussion with NamSU officials during meetings and presentations.

Partial goal was intended to make a literature review of the current state of the art of analysis of LMS and their usage among higher education institutions with a special focus to Uzbekistan. According to author the art of analyses included the current state of LMS, internet usage, e-learning, distance learning and online education is analyzed and stated as per the condition of case country. During research author analyzed that the Tashkent Information technology is leading the industry and the rest governmental institutions are leaning on them.

The results can help the higher and secondary institutions to have an LMS in their own environment with higher performance lower cost of revolutionized IT industry to draw their future with more technical and online world. This would also help young professionals to improve their computer skills. In the meantime, future professionals would get ready for a more computer-aided environment, which in turn makes Uzbekistan more attractive to the industry, spurring the interest of many companies.

Some of the limitations of the research is that there were not enough up-to-date and reliable data (for example surveys from all university staff and students) that could be used to identify the needs of the end users more effectively. That being said, the higher and secondary institutions of Uzbekistan would benefit quite well from the research conducted in this thesis.

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8 APPENDICES

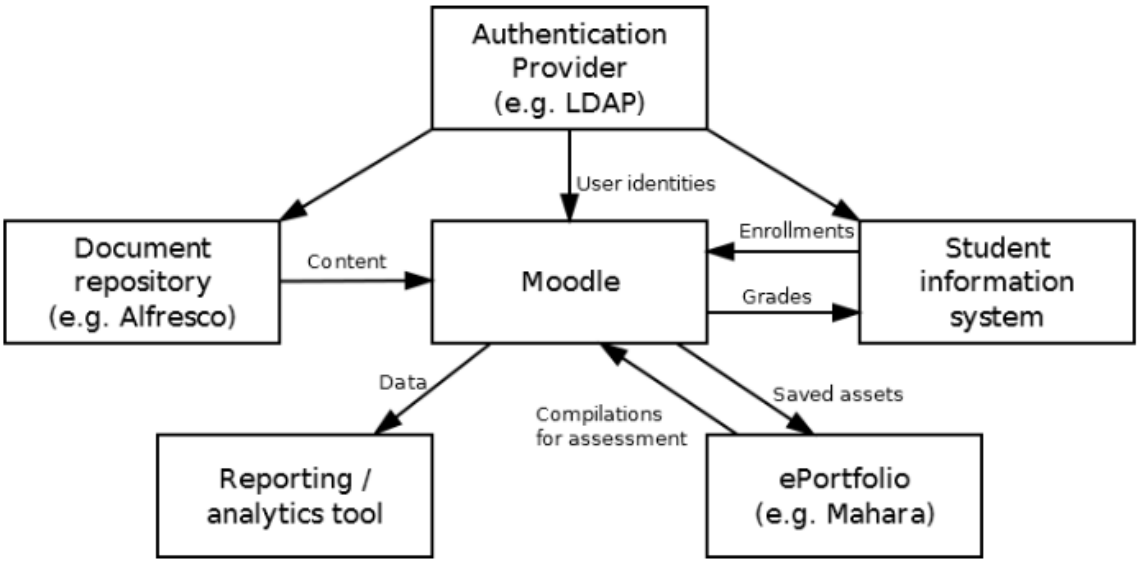
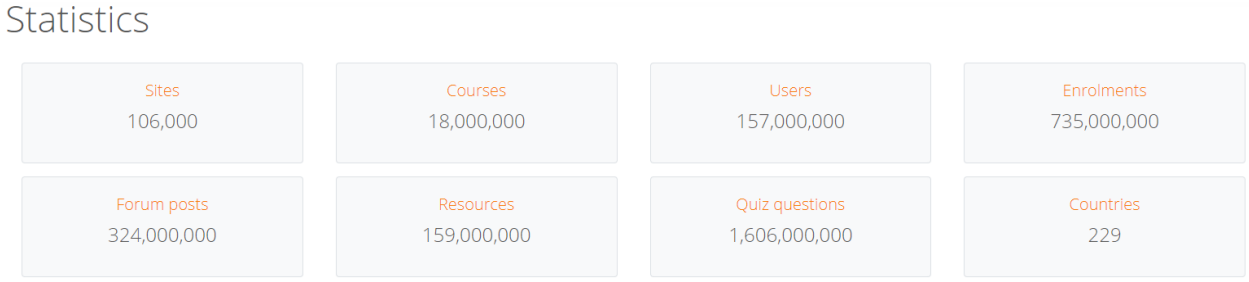
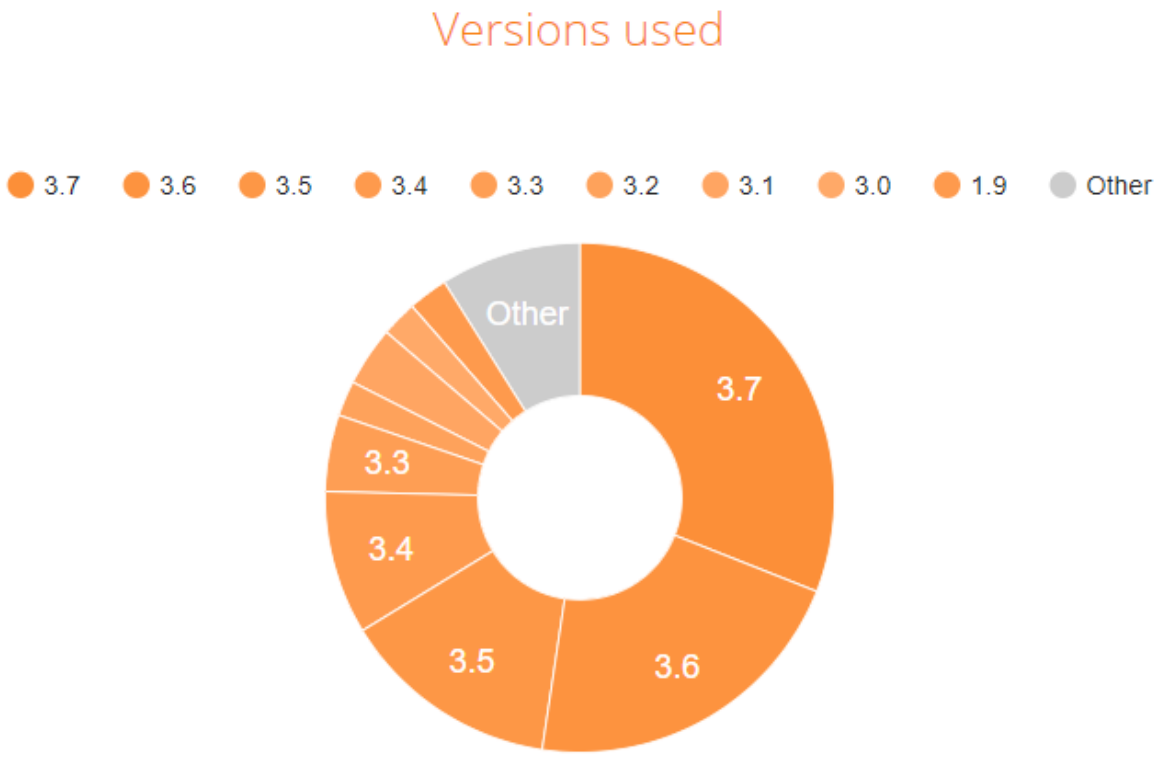


Figure 10 *Moodle system architecture for Education purposes.*

Figure 11 (Moodle, 2019)



Moodle statistics



Moodle versions are shown in Pie chart which are being used mostly worldwide.

Figure 12 (Moodle, 2019)

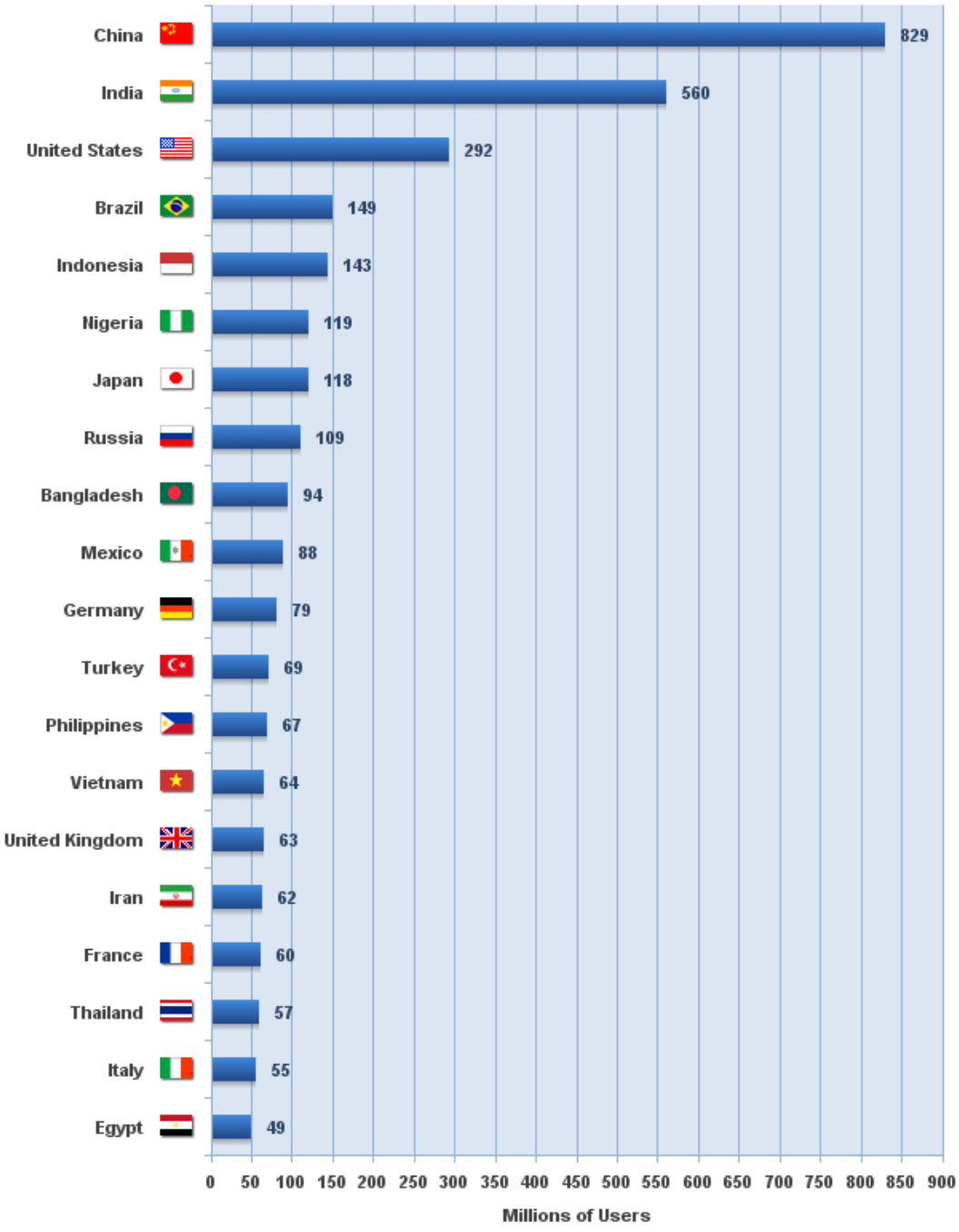


Figure 13 Top 20 countries with the highest number of internet users (Stats, 2019)