

Decision Steps on Adoption of Learning Management Systems in Kazakhstan: Perspectives for Improving Studying Efficiency

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Abstract: This article analyzes advantages and disadvantages of existing commercial and open source Learning Management Systems (LMS) and provides suggestions on selecting the best LMS package as a tool for improving studying efficiency in institutions of higher education of the Republic of Kazakhstan. Authors of the article have selected and analyzed 5 commercial and 5 open-source packages and developed their suggestions on adopting the best LMS package. The authors analyzed and emphasized on some known properties (features) of commercial and open source LMS by number of languages provided by systems, by technologies used, by platforms supported by systems. The analysis are carried out in IBM SPSS 19. The analysis graphs are represented in the article. Taking into account all other available represented in the tables features like Support for Sharable Content Object Reference Model (SCORM), Support for Information Management Systems (IMS), Opportunity of expansion, examination system and others the article authors formulated possible final rating for commercial and open source LMS considered in the research. The results and conclusion are summarized in the article.

Key words: E-learning · Information and Communication Technologies · ICT · Learning Management System · LMS · Studying efficiency · SCORM · IMS

INTRODUCTION

Use of information and communication technologies (ICT) in higher educational institutions of Kazakhstan is a part of governmental policy for informatization of the society and education. Informatization of the society is considered as a key factor for competitiveness of the national economy in the President of the Republic of Kazakhstan Nursultan Nazarbayev's "Strategy of Joining Kazakhstan to the 50 Most Competitive Countries of the World. Kazakhstan on the Threshold of a New Leap in its Development" [1].

State program for the development of education of the Republic of Kazakhstan among other priorities concentrates on information-communication infrastructure of educational institutions, creation of system of open and distance learning, creation of national digital educational resources and introduction of education management information system (EMIS).

Current infrastructure of Kazakhstani universities is presented by computer labs, servers, interactive lecture halls (ILH), multimedia language laboratories (MLL), scientific virtual laboratories (SVL), techno parks, digital learning TVs, electronic reading rooms, resource centers, media libraries and Internet cafes. Kazakhstani universities are well equipped with electronic whiteboards, multimedia projectors, video cameras, televisions, video recorders, cameras, DVD and VCD-players.

Development and update of technical infrastructure of Kazakhstani universities is conducted by themselves in accordance with the Rules of state certification of educational institutions as stated in the order #1270 of the Government of the Republic of Kazakhstan from December 24, 2007. State certification is carried out every five years in a planned manner by the authorized body for the purpose of monitoring compliance of educational services provided by educational institution to the requirements of state educational standards.

Technological infrastructure of universities in Kazakhstan is characterized by widespread access to Internet on the basis of various channels: analog, dedicated, wireless, satellite, cellular, etc. The most common is a dedicated line and broadband communications. Unique is experience of KazNTU named after K.Satpayev with implementation of WAP-based technologies.

The essential problem is cost of access to Internet. Even it reduced in recent years by 2-3 times, Internet in Kazakhstan is still too expensive. The perspectives of connectedness to Internet will be focused on creation of Wi-MAX and Wi-Fi zones in local research and educational networks and their subsequent merges and as alternative introduction of WAP-access technology to Internet resources via mobile cellular communication.

However, Kazakhstan at the state level did not yet approved standards for information-communication infrastructure of universities. Graduate programs of educational informatization are local in nature, regulated by local conditions and depend on different financial capabilities of higher education institutions. Standardization of information-communication infrastructure of universities would allow harmonizing conditions for using of ICT and efficient collaboration in a networked world [2].

MATERIALS AND METHODS

Research methodology for selecting the best LMS package that suits current requirements of Kazakhstani universities and other educational institutions includes analysis of current situation with information-communication infrastructure and electronic instructional resources in universities of Kazakhstan, analyzing potential demand, comparing advantages and disadvantages of selected commercial and open source LMSs, identifying the best solution and providing recommendations for implementation in educational institutions of Kazakhstan.

Technological Infrastructure of Kazakhstani Universities: Open Source and Commercial Solutions: Technological infrastructure created in Kazakhstani universities is based on both Open Source and commercial systems, including the world's leading brands.

Among the open source systems the most widely used in universities of Kazakhstan are: RedHat Linux,

FreeBSD, Gentoo Linux, OpenOffice, Inkscape, Toad, Gimp, Moodle, Java, JQuery, Apache, Sendmail, MySQL, Squid, Postfix, 7Zip.

Very popular is commercial software from recognized world leaders:

- Operating systems: Microsoft Windows Server 2003/XP/Vista/Windows 7, UNIX;
- Utilities: WinRAR, WinZip, Nero;
- Anti-virus software: Dr. Web, Kaspersky, Norton Antivirus, Panda, Nod 32;
- Programming languages/databases: MySQL, Prolog, Visual Basic, Borland Delphi, Borland Pascal, C++, C++ Builder, JavaScript, HTML, Adobe Flash, PHP, MSDN;
- Graphics and multimedia software: BSPlayer, Adobe PhotoShop, CorelDRAW, Maya, Toonboom, AutoCAD, Windows Media Player, 3dsMax
- Office software: Microsoft Office, Deform, ABBYY, Adobe Reader, Fine Reader;
- VoIP applications, instant messaging, web browsers: Skype, Internet Explorer, Opera, Chrome, Firefox;
- Dictionaries and translators: Izet, Tsh mash, PROMT, ABBYY Lingvo.
- Workflow systems: 1C Accounting, Lotus, SAP, etc.

In universities of Kazakhstan technologies for sharing and reusing resources through the Internet and local networks represent a qualitatively new level for software. The most widespread technologies in Kazakhstani universities are:

- Customer Relation Management Systems (CRM)
- Learning Management Systems (LMS)
- Content Management Systems (CMS)
- Interactive Learning Environment Systems (LENS)
- Enterprise Resource Planning Systems (ERP)
- Planning Management Systems (PMS)
- Testing Systems (TMS) and other.

All higher education institutions of Kazakhstan have their portals and websites. They are informative, monitoring or educational in nature. A distinctive feature of the leading portals of Kazakhstani universities is their functioning as application software systems implemented in the interactive design environment. Some Kazakhstani universities have an extensive electronic infrastructure.

Technological systems, portals, sites, software and hardware infrastructure differs from university to university. There is a set of common services provided by Kazakhstani universities. Basic services are communication and navigation. The most common communication services (in decreasing order) are: questions and answers, letter to the rector, feedback (message to the site administrator).

In resource services Search System and indexing of educational resources, creation of user interfaces and creation of new information resources are weakly developed, there are no links to secondary resources. Is not provided or not supported automatic replication of meta-descriptions of primary and secondary information resources between universities and portal of MES. Each institution develops its own database, electronic catalogs and digital libraries, but there are no interrelations between universities, i.e. no links to educational resources from other universities. Educational resources of universities are closed and are only available to its students and faculty.

Technological support of websites and portals is done by leading IT companies based on international cooperation and public-private partnerships, as well as by IT specialists of universities. Technical support is provided by university centers of new technologies in education or centers of educational informatization [3-5].

Kazakhstan's law "On Education" states that distance learning is related to technologies that can quickly adapt vocational education to the changing needs of society and labor market. MES and Kazakhstani universities have developed a set of documents, regulating distance learning in the form of concepts, programs and plans of action. At present more than 10 Kazakhstani universities have integrated distance learning into their teaching processes, but this rate is still relatively low.

Almost all universities of Kazakhstan have developed and converted their content to web-technologies. Unfortunately large-scale process of educational informatization with use of digital learning resources in Kazakhstan did not had a significant impact on change of governmental documents regulating university education – standards, curricula and training programs. The process of updating them is not determined by developments in ICT. Teaching research in different countries proved that use of ICT intensifies learning process and at the same time improves academic performance, both by 3 times and provides personalization of education.

Kazakhstan by now has not enough developed network interaction between academics and students and e-learning. One of the reasons is low preparedness of faculty to educational activities over Internet.

Thus, state policy in the sphere of educational informatization has become crucial for improvement of national educational model of the Republic of Kazakhstan. Formation of modern culture of future information-communication professionals is an important socio-pedagogical task for Kazakhstan's higher education, implemented on the basis of experience gained by the use of ICT. Degree of training of competitive specialists determines the level of technological development of the Republic of Kazakhstan, which determines the strategic position of Kazakhstan in the context of the global open space [1].

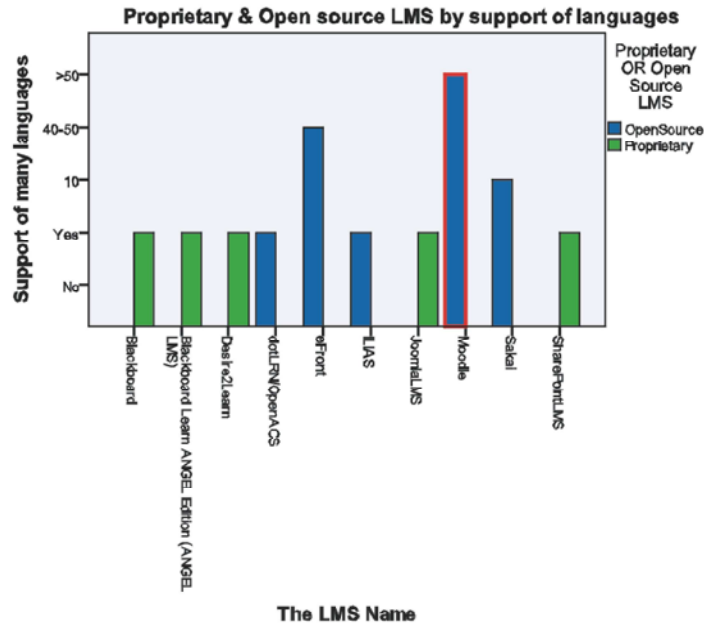
Matching educational standards to the new objective conditions, implementation of effective teaching tools, such as LMSs is the prospect for development of higher education in Kazakhstan.

Key Factors Affecting Selection of Commercial or Open Source LMS Platform: The problem of selecting LMS platform on which virtual training environment will be organized is critical and depends on many factors: requirements of educational institution, functional characteristics of LMS platform, users' environment and available budget to acquire and support the desired platform.

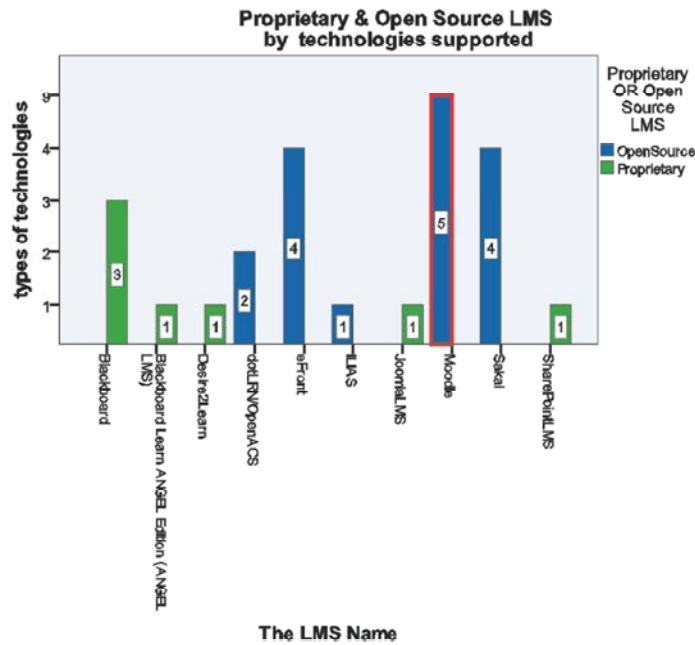
Advantages of commercial software are widely known: in majority they are reliable products with an appropriate level of user support, regular upgrades and new versions.

However, there are also drawbacks. Commercial packages are closed platforms in which source code is inaccessible to technical support of institution; therefore even small changes at users' level are not possible. The institution has to carry high cost of any commercial product, regular payments to extend the license, as well as for the increased number of users.

Open Source solutions are considered as desirable alternative, especially in the period of cost-cutting measures. Open Source LMSs are the most natural choice for educational institutions as its roots lay in idea of cooperation and the ideology allows combining talents and experience of plenty of teachers, students, volunteer-programmers in development and perfection of educational software products. Moreover, such software



Pic. 1: Analysis of LMS on the basis of support of multi-languages



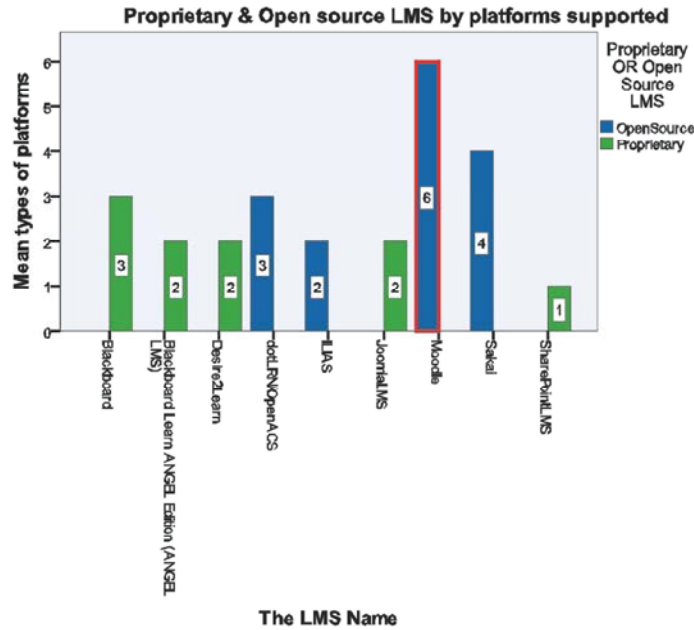
Pic. 2: Analysis of LMS on the basis of support of technologies

can function as a flexible tool focused on training and may be adapted for this or that curriculum. To disadvantages of such software can be attributed uncertainty and doubts of users towards reliability of programs, as well as problems with accessibility standards [6].

Kazakhstani universities demonstrate hidden demand in LMS, as technical infrastructure for their implementation considerably improved in recent years.

Comparative Analysis of Selected Commercial and Open Source LMSs: Comparative analysis are made with the descriptive statistics tool of IBM SPSS 19 based on the features of LMS clustered as commercial and open source represented in the Pictures 1,2,3.

Results of comparative analysis are presented in Table 1 for commercial and in the Table 2 for open source solutions.



Pic. 3: Analysis of LMS on the basis of support of different platforms

Table 1: Comparative Analysis of Proprietary LMSs.

| | Blackboard Learn ANGEL Edition (ANGEL LMS) | Blackboard | Desire2Learn | JoomlaLMS | SharePointLMS |
|---|--|---|--|---|---|
| Final Rating | 2 | 1 | 3 | 4 | 5 |
| Current version | 8.0/7.4 (April 2009) | 9.1 (April 2010) | 10.1 (2012) | 1.2.0 (August 29, 2011) | 2.0 (April 15, 2009) |
| Type, License, Fee | Proprietary; The standard license is based on the number of user accounts required by an institution. | Proprietary; Annual license fee is based on FTE students | Proprietary; Initial startup fee. License fees are based on either an FTE or per user/enrollment depending on the client requirements. | Proprietary; Yearly license depending on the number of users | Proprietary; Registered users based licensing model. |
| Multi-language interface | Yes | Yes | Yes | Yes | Yes |
| Support for Sharable Content Object Reference Model (SCORM) | Yes | Yes | Yes | Yes | Yes |
| Support for Information Management Systems (IMS) | Yes | Yes | Yes | | |
| Opportunity of expansion | Yes, hosted services | Yes, hosted services | Yes, hosted services | Yes, hosted services | Yes, hosted services |
| Technologies | MS SQL Server | MS SQL Server, MySQL, Wiki | MS SQL Server | MySQL | MS SQL Server |
| Platform | Windows, Mac OS | Windows, Mac OS, UNIX | Windows, Mac OS | Windows, UNIX | Windows |
| Testing System | Yes | Yes | Yes | Yes | Yes |
| Support for external tests | Yes | Yes | Yes | Yes | Yes |
| Restriction on number of users | No | No | No | No | No |
| Environment for developing teaching materials | Built-In | Built-In | Built-In | Built-In | Built-In |
| Examination System | <ul style="list-style-type: none"> • Multiple choice • Multiple answer • Matching • Ordering • Fill-in the blank • Short answer • Survey questions • Essay • Questions can contain other media elements (images, videos, audio) • Custom question types can be defined. Personal test banks, randomization of questions | Tests, tasks, seminars, activities at forums, instant messages: <ul style="list-style-type: none"> • Multiple choice • Multiple answer • Matching • Ordering • Jumbled sentence • Calculated • Fill-in the blank • Short answer • Survey questions • Essay • Questions can contain other media elements (images, videos, audio) Personal test banks, randomization of questions | <ul style="list-style-type: none"> • Multiple choice • Multiple answer • Matching • Ordering • Calculated • Fill-in the blank • Short answer • Survey questions • Essay • Questions can contain other media elements (images, videos, audio) • Custom question types can be defined. Personal test banks, randomization of questions | <ul style="list-style-type: none"> • Multiple choice • Multiple answer • Matching • Ordering • Jumbled sentence • Calculated • Fill-in the blank • Short answer • Survey questions • Essay • Questions can contain other media elements (images, videos, audio) Personal test banks, randomization of questions | <ul style="list-style-type: none"> • Multiple choice • Multiple answer • Matching • Ordering • Jumbled sentence • Calculated • Fill-in the blank • Short answer • Survey questions • Essay • Questions can contain other media elements (images, videos, audio) Personal test banks, randomization of questions |
| Reporting System | Developed | Developed, constantly develops | Developed | Developed | Developed |

Table 2: Comparative Analysis of Open Source LMSs

| | dotLRN/OpenACS | eFront | ILIAS | Moodle | Sakai |
|--|--------------------------|------------------------------------|--------------------------|--|----------------------------------|
| Final Rating | 4 | 3 | 5 | 1 | 2 |
| Current version | 2.4.1 (October 19, 2008) | 3.6.11 (April 24, 2012) | 4.2.5 (March 29, 2012) | 2.4.3 (March 18, 2013) | 2.9.1 (February 11, 2013) |
| Type, License | Open Source, GPL, OSI | Open Source, CPAL, OSI | Open Source, GPL, OSI | Open Source, GNU/GPL v3+, OSI | Open Source, ECL, OSI |
| Multi-language interface | Yes | Yes (40 languages) | Yes | Yes (54 languages) | Yes (10 languages) |
| Support for Sharable Content | Yes | Yes | Yes | Yes | Yes |
| Object Reference Model (SCORM) | | | | | |
| Support for Information Management Systems (IMS) | Yes | Yes | Yes | Yes | Yes |
| Opportunity of expansion | Yes | Yes | Yes | Yes due to external modules | Yes, due to external modules |
| Technologies | Oracle, PostgreSQL | Oracle, MS SQL Server, MySQL, AJAX | MySQL | Apache, Oracle, MS SQL Server, MySQL, PHP, PostgreSQL, wiki, RSS Feeds, Atom newsfeeds | MySQL, Oracle, wiki, RSS feeds |
| Platform | Windows, UNIX, Linux | Cross-Platform | Windows, UNIX | Windows, Linux, UNIX, Mac OS, FreeBSD, NetWare | Windows, Linux, UNIX, Mac OS |
| Testing System | Yes | Yes | Yes | Yes | Yes |
| Support for external tests (Blackboard, WebCT) | Yes | Yes | Yes | Yes | |
| Restriction on number of users | No | No | No | No | No |
| Environment for developing teaching materials | Built in | Built in | Built in | Built in | Built in |
| Examination System | Tests, tasks, activities | Tests, tasks, activities | Tests, tasks, activities | Tests, tasks, seminars, activities at forums, instant messages | Tests, tasks, activity at forums |
| Reporting System | Developed | Developed | Developed | Developed, constantly develops | Developed, constantly develops |

Second row shows final rating of systems (with “1” being the best).

CONCLUSIONS

Analysis presented in this article show that proprietary LMSs currently lead the e-learning market by offering more developed features to its clients. The disadvantage of such systems is cost that can be a critical factor for selecting a LMS solution, as many universities in Kazakhstan have a constrained budget. Therefore, the best solution on proprietary systems market – Blackboard can be recommended only for financially solvent educational institutions.

For LMSs considered for adoption by Kazakhstani universities the following conclusions may be done:

- Open Source LMSs allow solving the same range of problems as commercial systems, but universities can adapt a selected system to the needs of educational situation. Functionality of some open source systems is identical to its commercial analogues and sometimes even surpasses them.
- Most of commercial and open source systems are cross-country-platform and can work almost on any operational system and with any web browser.
- TCO for open source systems is significantly less than for commercial systems.

LMSs manufacturers claim that their solutions are SCORM certified, but there are three levels:

- Compliance – the lowest level. It is completely in competence of software developer to test its products against the standards. There is no independent control and in the case of incorrect claims, developer can suffer consequences only because of degraded public reputation.
- Conformity – the middle level. Software developer tests its products with authorized tools, but there is still no independent control.
- Certification – the highest level. Testing of conformity is performed by an independent authorized institution.

Most of LMS developers now meet only with the first level.

From the open source solutions Moodle is the most popular and developed LMS platform used by more than 63 million of users, which makes it a definite leader. The next best option is Sakai. Moodle is still in the process of rapid development and many educational institutions find it to be the best replacement for costly proprietary products, such as Blackboard.

Analysis finally shows that open source LMS (Moodle) has higher chances for adoption in local environment.

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