Types of LMS Deployment & Common Features

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In cooking, you have many different types of tools you can use to make a meal. For example, you have mixers, measuring cups, cutting boards, and so many other tools. Each tool is designed to meet the needs of the cooker and serve a specific purpose in the cooking process. An LMS is not different in that sense. There are several types of LMSs in the market being used for educational as well as training purposes, and one of the most difficult choices for organizations and institutions to make is deciding the type of LMS to select based on deployment or license (Pappas, 2014). Of course, many other factors (e.g., pricing, support, additional features, and others) must be considered and weighed in this decision. Still, the cost combined with financial and technical requirements are still the main focus when selecting an LMS (Croitoru & Dinu, 2016). Indeed, it is important to analyze and examine the type of LMS deployment because of its influence in the overall cost as well as other relevant requirements that can inform the decision about an LMS.

There are two main types of LMS deployment you need to be familiar with: (1) proprietary, and (2) open-source. Within those two solutions, there are two other distinct categories to be considered: (a) Software as a Service (SaaS) or cloud-based system and (b) Installed LMS. In order to determine what type of LMS is beneficial to an organization or institution, a clear understanding of the advantages and disadvantages of each solution must be reviewed. The following sections of this chapter will provide a definition for each main type of LMS deployment, compare their features based on the benefits and drawbacks, and discuss additional components/apps that can enhance an LMS.

Defining Proprietary (or Commercial) LMS

Imagine that you came up with an amazing recipe on your own, now you are faced with the dilemma: do I share this recipe with everyone? Or do I charge a fee to share my recipe partially with others? Well, if you choose the latter option, you follow a proprietary software model. In a proprietary software model, the "recipe," which is the source code, is composed of written commands developed by a programmer, and is often hidden from user's view not only as a technical, but also as a legal matter (Zittrain, 2004). The reason for this secrecy on the source code is to prevent others from developing new software without the proper permission from the copyright holders.

In the case of an LMS, a solution is considered proprietary, also known as commercial, when its software is licensed under an exclusive legal right of the copyright holder (Pillai & Kevin, 2013). For example, if your organization has adopted an LMS such as Blackboard, which is a popular commercial LMS at the time this chapter has been written, then its company gives your organization the right to use the software under certain conditions based on a license fee. The conditions are stipulated by the LMS company in the form of a contract or agreement between the parties involved and the cost of the licensing fee is often based on annual per-user licenses. The license fees usually

vary their cost between $15-$100 per user (Yupangco, 2018). In addition to the licensing fee, other fees might also be included for operation, maintenance and technical support of the LMS software.

In summary, the nature of a proprietary LMS is for profit, as schools and organizations pay a fee to use the software. And a proprietary software follows a "closed" source model in which the source code is kept in-house, i.e., within the company, and not released to the public (Pillai & Kevin, 2013). Going back to our cooking analogy, you can think of the software code as a famous restaurant's secret recipe. The restaurant keeps that recipe "closed" in-house without sharing any particular details or information to the public. This closed information allows the recipe to be intact without any consumers/users' alterations or any addition to the original recipe. The same goes for proprietary LMS. The company that developed the LMS software will not allow users to modify or add to their software source code. The LMS company either creates and manages the courses (Bran, 2017) or gives permission for an LMS administrator at the organization to do so, without sharing any access to the source code. This means that users cannot make any personal adjustments to the software because the LMS company controls its structure as well as the activities within their system (Wright, Lopes, Montgomerie, Reju, & Schomoller, 2014).

Furthermore, proprietary LMS solutions can either be installed or adopt a SaaS or cloud-based approach. Given that cloud-based LMS will be discussed in a separate section of this chapter, we will cover installed LMS in this part. An installed LMS is a software hosted on an organization's local server (Pappas, 2017). After purchasing an LMS from a vendor and obtaining its license for a determined time, the organization's internal IT team is usually in charge of installing and maintaining the LMS in-house (Johnston, 2015). This maintenance also includes making any additional upgrades and solving any technical issues within the LMS internally. Although it seems like a time-consuming and costly endeavor to an organization, this option can provide more customization, controlling and storing of data locally as well as compatibility with third-party applications (Pappas, 2017). Some drawbacks with this option involve the scalability of the LMS, which falls under the responsibility of the organization's IT team organization. These considerations need to be analyzed and assessed by the organization's team before deciding on an installed approach. If selecting this option, an organization should have an IT team in place to administer, provide support, customize the LMS as well as manage any other technical needs.

There are many proprietary LMSs available in the market. Some examples can be found in the Table 1 below:

Table 1

A List of Examples of Proprietary LMS

LMS	About
Blackboard	Is one of the largest LMS companies, serving approximately 100 million users around the globe (Blackboard Inc., 2020).
Desire2Learn	Is a growing LMS company with customers in K-12, higher education, healthcare, government, and the corporate sectors (D2L Corporation, 2020).
Litmos	Is a fast-growing LMS with approximately 21 million users in more than 130 countries (SAP Litmos, 2020).
Topyx	Is a global LMS company that provides engaging and interactive learning experiences to learners from different sectors,including businesses and nonprofit organizations (Interactyx, 2020).

Saba	Provides personalized learning experiences and limitless options for customers' learning programs (Saba, 2020).

Defining Open-Source LMS

Now, imagine that you want to share with others the amazing recipe you created. In fact, you want others to modify and create new versions of that recipe and share it with other people. Well, that means you are following an open source model. Open-source LMS allows anyone to have access to the source code, so they can make modifications or enhance the software. Overall, many LMSs are open source as they initially emerged as a university project instead of a business model (Croitoru & Dinu, 2016). In essence, open-source involves a community of users who collaborate with the focus "on teaching and pedagogy on top of the technical proper functioning of the system" (Bran, 2017). Collaborators of the open-source have to accept the license terms when they access the software, and generally, it grants users permission to modify, use, study and distribute the software (Opensource, 1999; Wright et al., 2014). According to the GNU General Public License, any individual or company can modify the open source code as long as they do not prevent others from further modifying the code either by charging them or licensing them (Pillai & Kevin, 2013). With that license requirement, there is a "copyleft" stipulation that requires anyone who made modifications to the software must share the source code of those changes (Opensource, 1999).

In summary, the nature of an open-source LMS is non-profit, as schools and organizations can use the software without paying any fee. An open-source software follows an "open" source model in which the source code is open to the public and can be "re-distributed for free provided credit is given to the original manufacturer" (Pillai & Kevin, 2013, p. 4). Going back to our cooking analogy, you can think of the open source code as a generic recipe that is shared to the public by a cooker. People can take this recipe and customize it by making modifications or adding ingredients for dietary needs. They can share the recipe with their modifications to the public as long as they do not prevent others from modifying the recipe further or charge them for using it. Additionally, the recipe should give credit to the original creator. The same goes for the open-source LMS. For example, the developer(s) of the LMS software create and allow other users to modify or add to their software source code. Users can make personal adjustments to the software and redistribute to other users as long as they do not profit from it or prevent others from making modifications. Giving credit to the original creators of the source code is also a common practice. Some drawbacks with open-source LMS include the need to purchase servers to host the LMS platform as well as trained personnel and staff to operate, optimize and maintain the servers (Yupangco, 2018).

There are many open-source LMSs available in the market. Some examples can be found in the Table below:

Table 2

A List of Examples of Open-Source LMS

LMS	About
Moodle	Is a platform created to provide educators and learners with a personalized learning environment, which can be downloaded onto their own web server. This platform involves a robust, secure and integrated system (Moodle, 2020).
ATutor	Is a web-based LMS developed to create and deliver courses online, allowing for quick installation or update as well as the development of customized themes (ATutor, 2020).

Sakai	Is an LMS that contains standard online learning, teaching, and collaboration tools as well as community-based contributions. Its open-source flexibility allows for customization and configuration of the software to meet the needs of the organization (Sakai, 2020).
Forma LMS	The initial LMS program was created by Docebo Srl and released to the public. Once Docebo switched its business model to a commercial distribution, a group of partner companies worked to create a new identity and workflow to the software as well as continue the open source project (Forma.lms, 2020).

Defining Cloud-based LMS

Cloud-based LMS is a true gumbo because there are many cooks in the kitchen when making this type of LMS. Each cook has the ability to use an array of different cloud-based tools and software they believe will enhance their instruction, and consequently the learning process (Wright, Lopes, Montgomerie, Reju, & Schomoller, 2014). A more formal definition of cloud-based software proposes a model to enable convenient and on-demand network access to "a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011). In other words, cloud-based LMS provides a service to organizations that allow them to access the LMS "on-demand without investing a lot in setting up the IT infrastructure" (Lal, 2015).

A cloud-based LMS focuses on the teachers and pedagogy practices like in an open-source model; however, it also provides a direct focus on the learners (Bran, 2017).

What does it mean? It means that this type of LMS follows socio-constructivist premises in supporting a "collaborative learning environment for individual and collective learning through interactive learning activities" (Kumar & Sharma, 2016, n.d.). Although a cloud-based LMS is hosted on the web under a vendor, it allows learners to access it from anywhere and on any device (Dufresne, 2017). That is, users can access this type of LMS from any mobile technology (e.g., computers, smartphone, tablets, etc.) independent of their location as long as they have access to the internet. Cloud-based LMSs are often a low-cost solution for organizations because there is no need to invest in sufficient/heavy IT infrastructure. Thus, this type of solution is more appropriate for small and medium-size organizations (Dobre, 2015). This solution also allows instructional designers to upload courses, learning paths and implementation of an array of web-based tools. Students have the ability to use web-based tools that they may be familiar with as a result of social networking or workplace use.

Although many cloud-based LMSs can be free for users, there are some that charge a fee according to the usage (i.e., pay-per-user or pay-per-use) or a regular license fee. In a pay-per-user model, the LMS vendor can charge an organization in the following manner: (a) for each user that is actually registered to use the software, or (b) for each user that logins and uses the software. Conversely, in the pay-per-use approach, a charge fee is made everytime that the organization uses (i.e., the definition of use in this context will vary according to the vendor) the LMS (Simpson, 2017). Overall, cloud-based LMS involves "paying a fee to a 3rd party for the use of its software, computing power, and technical expertise instead of maintaining on your own" (Curran, 2011, n.d.). Interestingly, cloud-based services are not limited to proprietary software, some vendors also operate open source software as well (Curran, 2011). However, when using an open source LMS, the user only pays for the "cloud" uptime and support services. Some examples of cloud-based LMS can be found in the

Table below:

Table 3

A List of Examples of Cloud-Based LMS

LMS	About
DigitalChalk	Is an LMS that provides customers with tools to build their online business quickly, safely, and effectively (DigitalChalk, 2020).
Canvas	Is one of the most widely adopted LMS in North America with its market increasing across 70 countries (Instructure, 2020).
Docebo LMS	Is an LMS that uses learning-specific artificial intelligence algorithms to produce more effective learning experiences (Docebo, 2020).
TalentLMS	Is an online platform created to provide a lean, intuitive and hassle-free learning experience to learners (Epignosis, 2020).

Comparing the types of LMS

When deciding which meal to cook, you probably weigh the strengths and weaknesses of the tools you have available in your kitchen. The purpose is to select optimal tools that will help your work, making it more efficient and effective. In the case of LMS, the goal is the same. You need to compare and contrast the LMSs available in the market before making a decision. Usually, people assess the LMS based on its features, flexibility, cost, and other important LMS functions. One way to start this process is by analyzing the main types of LMS before deciding the type that will meet your needs. For example, when selecting a proprietary LMS, customers might select this option because this type of LMS usually provides high support; however, the cost associated with this option might be a downside. A better comparison and contrast of each option can be found in the table below:

Table 4

Comparison of the Types of LMSs

Category	Proprietary	Open-source	Cloud-based	Sources
Service/ Support	Usually provides: • Software Training • Templates • Technical support • Maintenance • Warranty service	Has limited support: • In-house technical support is needed • Lack of security and privacy settings • No accountability for technical issues	Usually has: • No set privacy and security measures	• Lynch (2018) • Bran (2017) • Wright et al. (2014) • Pillai & Kevin (2013)

Cost	Usually expensive: • Enrollment-based • Annual license fees • All-the-time service payment	Usually free or free for basic packages. Advanced features will have extra cost such as: • Hosting • Maintenance • Back-ups • Extra storage space • Upgrades • Tech support	Cost-negligible or low: • Transparency of future expenses • Advertisements may be included to help the software remain free	• Bran (2017) • Wright et al. (2014)
Reliability	Usually a reliable source: • Built by professionals who provide further training • Research supported and current technology • LMS or features/tools adopted by the company may be discontinued	Reliability is limited as code quality, accuracy, and update may not be maintained.	Reliability is on internet connection. It also offers scalability, as the software will work the same independent of the number of learners or instructors.	• Bran (2017) • Wright et al. (2014)
User-Friendly	Customization is limited: • Few possibilities to try new features or tools • Customization delivery and appearance are challenging	Usually has high customization: • Source codes can be customizable • User can change and add new features or tools • Broader range of themes for delivery and appearance	Customization is moderate and it needs familiarity with the tools. • Activity focused, as tools are designed to engage and promote learner-centered activity. • Easy to store and arrange documents and date into an excel or PDF report • Lack of authentication- limited methods of determining enrollment, assessment or grades	• Lynch (2018) • Bran (2017) • Gawliu Jr (2015) • Wright et al. (2014)
Data Sharing	It usually links to other enterprise software systems, but data can be lost if the course leaves the hosted LMS.	Software updates are available; however, there is a possibility of stagnancy if community members are no longer developing.	Learners can access material anywhere and at anytime and can easily collaborate or share information	• Lynch (2018) • Bran (2017) • Gawliu Jr (2015) • Wright et al. (2014)

Flexibility	Usually limited - inability to adjust the software, add features, or address issues immediately by users and their organization	High flexibility – allows for adjustment of the software, adding features as well as collaboration because of the software and source code being accessible to anyone.	High to moderate flexibility - variety of tools and features available.	• Lynch (2018) • Bran (2017) • Wright et al. (2014)
Software	Constrained- it can be restrictive and difficult to use or add new features. Software may not be maintained for current treads/uses.	Open – allows for suggestions and new ideas because of collaborative community development. Software may not be maintained for current treads/uses.		• Bran (2017) • Wright et al. (2014)
Device Installation/Use	Software might need to be installed on a server instead of personal devices	May need integration with existing administrative systems or the need to establish an administrative system. Software can also be installed on personal devices	No need to install software. There is no need for a server or IT expertise. Easy distribution of course, mobile device friendly and real time reporting/ access to documents.	• Bran (2017) • Gawliu Jr (2015) • Wright et al. (2014)
License Agreements	License agreement may be restrictive in how the software is implemented, distributed, and administered			• Bran (2017) • Wright et al. (2014)

Compents/Apps that Enhance LMS

Most LMSs include user management features such as user account and profiles, authentication as well as roles and permissions (Foreman, 2018). In addition to user management features, LMSs also include some general features that assist the operation of the platform such as: (a) content, in which instructional materials are upload or displayed for learners, (b) communication, in which instructors and learners interact via email, discussion, announcements, etc., (c) assessment, in which instructors can create assessment materials to learners such assignments or tests, and (d) administrative, in which instructors and students can manage the courses and even customize individual courses. Although those features are common in the LMSs, customers might want to add extra components and apps to enhance the online environment.

Adding a little extra seasoning to your LMS never hurts. Thus, there are a few free cloud tools that can be used to create a kind of personalized LMS. These tools work well with open-source and cloud-based LMS.

1. Facebook: a popular social media tool that could be integrated with the LMS for

personalization such as common interests, hobbies, etc.
2. Google Drive: a cloud-based storage that could allow instructors and students to store and share large documents/files online.
3. Dropbox: another cloud-based storage that could allow instructors and students to store and share large documents/files online.
4. Skype: a video conferencing system that allows instructors and students to meet synchronously.
5. Flickr: an online photo management that allows instructors and students to use and share photos.
6. YouTube: a video streaming platform that allows instructors and students to share videos.
7. Camtasia: a video editing and production tool that can be used in video creation and sharing.

References

ATutor (2020). ATutor: Learning management system. Retrieved from https://edtechbooks.org/-SLvR

Blackboard Inc. (2020). About us. Retrieved from https://edtechbooks.org/-QpKI

Bran, L. (2017, November 7). What type of LMS is best for your school: proprietary, open-source, or cloud-based? [Blog post]. Retrieved from http://blog.neolms.com/type-lms-best-school-proprietary-open-source-cloud-based/

Croitoru, M., & Dinu, C. (2016). A critical analysis of learning management systems in higher education. *Academy of Economic Studies.Economy Informatics*, *16(*1), 5-18. Retrieved from https://edtechbooks.org/-NFwp

Curran, T. (2011, November 8). Open source or proprietary LMS? Your answer, my friend, is floating in the cloud. Retrieved from https://edtechbooks.org/-zNF

DigitalChalk (2020). Features. Retrieved from https://edtechbooks.org/-Smc

Dobre, I. (2015). Learning management systems for higher education: An overview of available options for higher education organizations. *Procedia-Social and Behavioral Sciences*, *180*, 313–320. doi: 10.1016/j.sbspro.2015.02.122

Docebo (2020). Learn LMS. Retrieved from https://edtechbooks.org/-vBH

D2L Corporation (2020). About D2L. Retrieved from: https://www.d2l.com/about/

Dufresne, M. (2017, December 31).Open source LMS vs cloud-based LMS [Blog post]. Retrieved, from https://www.skillbuilderlms.com/open-source-lms-vs-cloud-based-lms-which-is-right-for-you/

Epignosis (2020). About us. Retrieved from https://edtechbooks.org/-kqe

Foreman, S. D., & Association for Talent, D. (2018). *The LMS Guidebook: Learning Management Systems Demystified*. Alexandria, VA: Association For Talent Development.

Forma.lms (2020). The project. Retrieved from https://edtechbooks.org/-Kps

Gawliu Jr., H. (2015, February 19) Cloud-based LMS - 4 Reasons why is it important [Blog post]. Retrieved from
https://www.litmos.com/blog/mobile-learning/4-reasons-why-using-a-cloud-based-learning-management-system-is-important

Instructure (2020). About us. Retrieved from https://edtechbooks.org/-BdLQ

Interactyx (2020). About TOPYX. Retrieved from https://www.topyx.com/about-us

Johnston, M (2015, June 1). In the cloud or on-premise: Choosing a learning management system. Retrieved from https://edtechbooks.org/-fad

Kumar, V., & Sharma, D. (2016). Creating collaborative and convenient learning environment using cloud-based moodle LMS: An instructor and administrator perspective. *International Journal of Web-Based Learning and Teaching Technologies* (IJWLTT), *11*(1), 35-50. doi:10.4018/IJWLTT.2016010103

Lal, P. (2015). Organizational learning management systems: Time to move learning to the cloud. *Development and Learning in Organizations: An International Journal*, *29*(5), 13-15. doi:10.1108/DLO-12-2014-0093

Lynch, L. (2018) 6 advantages of using an open-source LMS [Blog post]. Retrieved from https://edtechbooks.org/-hzZ

Mell, P. and Grance, T. (2011). The NIST definition of cloud computing recommendations of the national institute of standards and technology *NIST Special Publication*,*145*(6), 7.

Moodle (2020). About Moodle. Retrieved from https://edtechbooks.org/-iQR

Pillai, D., & Kevin, S. (2013). Is it the end of the road for proprietary e-learning solutions? - A literary journey to find the truth. *The International Journal of Management*, *2(*1), 1-17.

Opensource (1999, December 31). What is open source? [Blog post]. Retrieved from https://edtechbooks.org/-eXXk

Pappas, C. (2014, January 18).The 20 Best Learning Management Systems (2018 Update). Retrieved from https://edtechbooks.org/-hmu

Pappas, C. (2017, January 19). Web-based vs installed LMS: Which is the best LMS for your needs? Retrieved from https://edtechbooks.org/-YLG

Saba (2020). Learning and skill development. Retrieved from https://edtechbooks.org/-Irmx

Sakai (2020). Feature details. Retrieved from https://edtechbooks.org/-GKY

SAP Litmos (2020). About us. Retrieved from https://www.litmos.com/company

Simpson, A. (2017, June 4). The true cost of a learning management system. Retrieved from https://elearningindustry.com/true-cost-of-a-learning-management-system

Wright, C.; Lopes, V.; Montgomerie,T.; Reju, S.; & Schomoller, S. (21 April, 2014). Selecting a learning management system: Advice from an academic perspective. Retrieved from

https://edtechbooks.org/-JmIh

Yupangco, J. (2018, January 13). Open source vs. proprietary LMS: Assessing return on investment. Retrieved from https://edtechbooks.org/-yEgH

Zittrain, J. (2004). Normative Principles for Evaluating Free and Proprietary Software. *The University of Chicago Law Review*,*71*(1), 265-287. Retrieved from www.jstor.org/stable/1600520
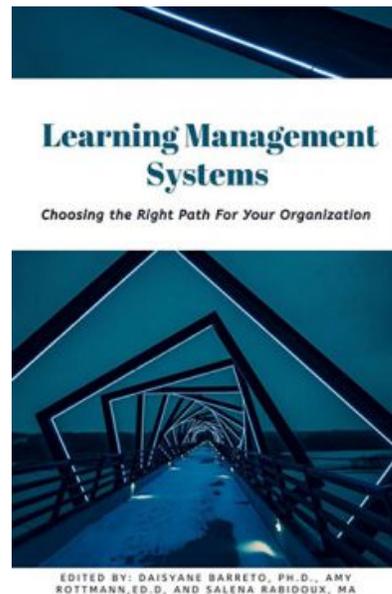
Barreto, D., Rottmann, A, & Rabidoux, S (2020). Types of LMS Deployment & Common Features . In D. Barreto, A Rottmann, & S Rabidoux (Eds.), *Learning Management Systems*. EdTech Books. Retrieved from https://edtechbooks.org/learning_management_systems/types_of_lms_deployment