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## CLOUD-BASED LMS FOR E-LEARNING

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### ABSTRACT

Nowadays the LMSs are the main software tool for organizing and supporting contemporary e-learning. Cloud computing technologies are widely used not only for business purposes, but also in education area. There are lots of cloud-based Learning Management Systems, providing services for collaborating, evaluating and creating learning content. The aim of the current work is to research, evaluate and compare some of the cloud-based LMSs. A set of common criteria, used for LMSs, is implemented for estimating the advantages and disadvantages of cloud-based systems for e-learning.

**Keywords:** Cloud-based LMS, ESaaS, LMS, E-learning, Cloud computing

### INTRODUCTION

The new information technologies have changed the way of teaching and learning. Being the state of the art in education means that the institutions providing e-learning should offer new opportunities for self-regulated e-learning consistent with the new expectations and needs of nowadays digital learners.

Combining the features of traditional learning systems with the cloud-based ones will give the organizations a powerful tool that is cost effective, easy to maintain, secure and engaging learners and teachers.

The aim of the current work is to explore cloud-based LMSs, their advantages and disadvantages and to propose a number of selecting criteria for choosing the most appropriate one for educational and non-educational institutions.

### LEARNING MANAGEMENT SYSTEMS (LMS)

Learning management systems are one of the main tools for conducting quality online training. They are platforms for user management in their interaction with educational content that is created and presented in a suitable format. These systems are web-based, which facilitates the access to them.

The accent is on the students - their registration, tracking activity and progress through course assignments and other activities enabling assessment and evaluation. These systems are mainly used in blended learning, which combines elements of the traditional way of teaching in the classroom and the specifics of the e-learning. They can be used both in educational institutions and the business staff training.

According to (1) required key features of such systems are:

- **Integration with other systems** - synchronization of the data with other information systems allows new members of the organization to be added to the e-learning system and have their respective roles assigned;
- **Administration tools** - administrator should manage user accounts, define roles, create and manage courses, have full access to the system. The most important requirement is that the system should be operated via an easy and accessible interface;
- **Access to content** - this includes the e-learning environment, teaching methods, language in which the content is delivered and the users of the content;
- **Creating content** - includes creating, maintaining and storing educational content;
- **Evaluation and knowledge management** - activities such as assignments

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and tests allow assessment and monitoring the skills and knowledge of the learners;

- **Evaluation tools** - evaluating in the course itself gives valuable feedback to developers about the functionality and effectiveness of the system;
- **Support standards** - enables learning content to be available in other LMS, which support appropriate standards;
- **Configuration** - it is desirable the system to allow set up and customization to the needs of the organization;
- **Security** - security is an important part of any system. Personal data of users stored in it should be password protected and encrypted.

The growing number of open source LMSs such as Moodle, Camilo LMS, Canvas LMS, aTutor LMS, eFront LMS, OLAT LMS, Sakai LMS etc., allows their widespread use in education and created communities support their continuous development and maintenance.

(2, 3) synthesized the main features that should have LMS to meet the new needs of learners of the net-generation:

- to be constructivist-oriented, focused on pre-defined by learners goals;
- to support collaboration and team work in and outside the institution;
- to allow personal assessment and tracking the success of students, to support generating reports;
- to achieve integration between systems for better communication and collaboration between them and between all stakeholders;
- to improve support for professional diagnosis and development for all stakeholders, including teachers;

**Table 1.** *Difference between the traditional educational software and ESaaS*

	<b>Traditional Education Software</b>	<b>ESaaS</b>
Platform	Multi version	Single platform
Pricing	Maintenance + License	Subscription (all inclusive)
Delivery	Installed	Hosted
Development	Longer Cycle	Continuous Cycle
Allocation	Capitalised	Expensed
Additional Cost	Installation, Maintenance, Customization & Upgrades	Configuration
Profits	Initial Sale	Ongoing
Sales Focus	Close the deal	Prove Value
Feedback Cycle	Long	Short
Success	New License revenue	Lack of Churn
Updates	Longer, less frequent	Shorter, Frequent

### 1. ADVANTAGES OF CLOUD-BASED LMS

Cloud-based LMSs have a lot of advantages that makes them a good solution for the

- to improve the cost efficiency and better management of the resources available at the moment.

### CLOUD-BASED LMS

In recent years, the share of consumers of cloud services not only for business purposes but also in training, is increasing. Studies and statistics show that revenues at the end of 2015 by using SAAS will grow to \$ 22 billion. In 2015, there seems to be a tendency towards cloud-based LMSs, as 87% of the respondents were found to use a web-based LMS, compared to only 13% who have an installed LMS (4).

E-learning allows users to achieve good results in a short time. Many organizations and companies use the opportunities for training the staff at a convenient time and place. This contributes to improving the quality of personnel, its growth, which will allow the company to be competitive and achieve its objectives, reduces the cost of hiring new workers, train employees and redirects them to other sectors of the company (5).

**Cloud-based LMSs** are representatives of **SAAS** (Software-as-a-Service) and integrate key features of the traditional LMS and the functions of cloud services.

A new term is introduced – **ESaaS- Education Software-as-a-Service**, describing cloud services training as a new model for training (6).

**Table 1** presents the differences between traditional educational software and systems and cloud-based services for education.

institutions to provide contemporary e-learning (6, 7, 8):

- No hardware to purchase and maintain;
- No in-house IT staff required;

- No client software required ;
- Easily expandable;
- Anywhere and anytime access to training;
- Flexible and customizable;
- Protected and secure access;
- No need to manage the software;
- Streamlines workflow processes;
- Mobile capacity;
- Cost effective;
- Allow family and community involvement through institutional website;
- Improve the school administration's ability to manage multiple systems from one integrated E-Education System;
- Encourage and increase sharing of resources and best practices.

Adopting the model of cloud services in education would have a positive impact in several aspects (9,10):

- Large capacity.
- Short implementation process.
- High availability.
- Just in time learning.
- Different personalized tools to meet learners' personal needs and preferences.

By applying the model of cloud computing in education could be created personal learning environments that support formal and informal learning. There are many cloud-based tools and gadgets, that can be integrated and through which is implemented self-regulated, teacher-led, and personalized pedagogical approach (11).

## 2. DISADVANTAGES OF CLOUD-BASED LMS

The use of free and open source software is an advantage, it saves money and the created communities of experts in the field ensure its improvement and renovation.

In the case of free cloud-based LMS is not always a good solution for the organization for several reasons:

- Unsecure data protection;
- Limited control for customization to the needs of the organization;
- Extra money for the staff, responsible to maintain the software;
- Resources for ensuring and maintenance the infrastructure.

## SELECTION CRITERIA FOR CLOUD-BASED LMS

An important condition for achieving efficiency in e - learning is the selection of appropriate e-learning environment. It requires exploring among the available cloud-based LMS because not all of them offer the same services, conditions for maintenance and customization.

This necessitates the establishment of criteria for their evaluation to be implemented to meet the needs of the organization.

Some of the features that a cloud-based LMS should possess are (7):

- **Scalable** – to support large number of users;
- **Flexible** - to meet the needs of consumers;
- **Social features** – to support communication and social connectivity between users through blogs, forums, link with social networks, collaboration tools for working on common projects
- **Tracking the progress of learners** – to support tracking the success and activity of users through various statistics and reports;
- **Customizable** – to provide opportunities for organizing learners into groups and classes and the opportunity to customize the look of each organization;
- **Security** – to provide security from external and internal attacks, as well as tools for their follow-up;
- **Support** – ongoing 24/7 support from specialists.
- **Easy for use** – no training required;
- **Integration** with other systems and platforms (Google Drive, Dropbox, YouTube, Flickr)
- **Standards (SCORM)** – support standards for packaging and integrating e-learning courses in different LMSs.

## EXAMPLES OF CLOUD-BASED LMS:

Nowadays the number of cloud based LMSs is rapidly growing. The choice of the most appropriate one is very important for the institution. Selected cloud –based LMS should be consistent with the consumers who will use it, the learning objectives and the number of users (students), the provided services and the price.

The aim of the current paper is to explore some cloud-based LMS, their main features and functionalities.

Two courses 'Informatika' and 'Biostatistics' have been created to test features of four cloud-based LMSs. It was possible to explore only their basic features offered in a free plan for teachers and organizations.

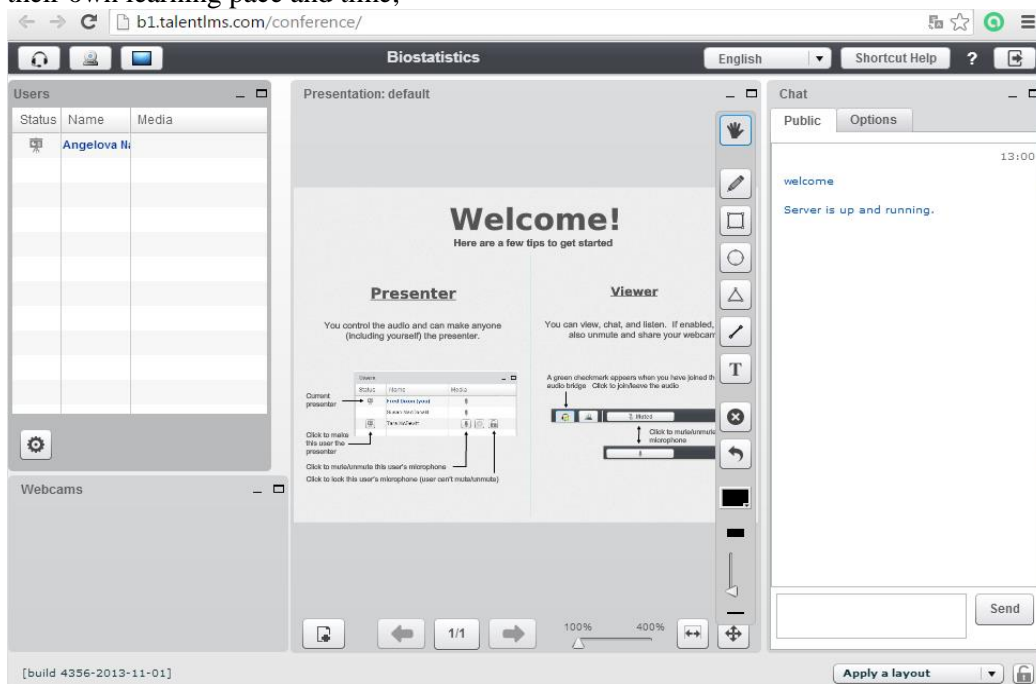
### 1. Talent LMS

There are three types of users – Administrator, Instructor and Learner. Each one of them has different roles and permissions.

This cloud-based LMS has the following characteristics (12):

- User friendly interface and easy to work with it;
- Ability to add different content formats - audio, video, web content, discussions. Usually lessons are interactive, combining text information, multimedia elements and questions that help learners to check if they understand learning material ;
- Support standards - import files in SCORM format and Tin Can;
- Personalized learning paths - conditions for completion of activities and accessibility to the following resources. It helps learners to follow their own learning pace and time;

- Certificates;
  - Web conference – instructor can set a conference up to 240 minutes, organize live sessions, using tools for a whiteboard, as it shown on **Figure 1**;
  - Statistics estimates learners’ activity and progress;
  - Gamification tools like points, badges, levels, rewards, leaderboard engage learners.
- From pedagogical point of view these features help teachers to organize learning content in an appropriate format, according different learning styles.



**Figure 1.** Created conference for the course Biostatistics in Talent LMS

## 2. Litmos LMS

This cloud-based LMS is very popular and has more than 1 000 000 users all over the world. It provides an opportunity for integration with (3th party integration) - Box, Dropbox, Google+, Citrix) and the system is fully supported in all mobile devices.

It also offers tools for (13):

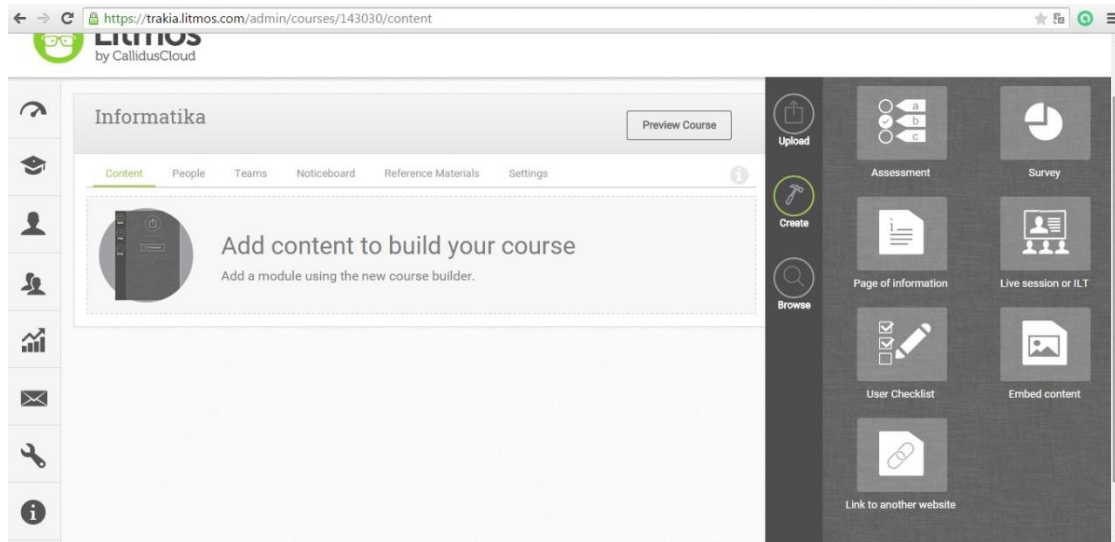
- Communication and connectivity of users;
- Statistics and feedback;
- Creating content in different formats (**Figure 2**), SCORM and TinCan standards;
- Personal learning paths;
- Certificates of completion for learner achievements ;
- Personalization and different language support.
- Web conferencing supported by Go To Training integration

## 3. Edmodo LMS

This cloud-based LMS is established in 2008 and has a user-friendly interface to meet the

needs of the new generation of learners. It is used mainly for school education and is very simple for use, no training required. The system resembles a view of the social network, where the teacher can add content, quizzes and polls. Gamification is achieved by the use of badges. It offers a place (Library) for storing files and links, organized in folders and also integration with Google Drive. It does not allow setting restricted criteria to organize personal learning paths.

**Edmodo Spotlight** provides an opportunity to add educational applications in various fields and levels of education. Creating communities and sharing ideas and resources that provides educational support for teachers. **Edmodo Snapshot** is an easy to use tool for generating formative assessments aligned on specific standards. **Edmodo Store** offered apps organizing in categories by subjects and more of them are free to use (14).



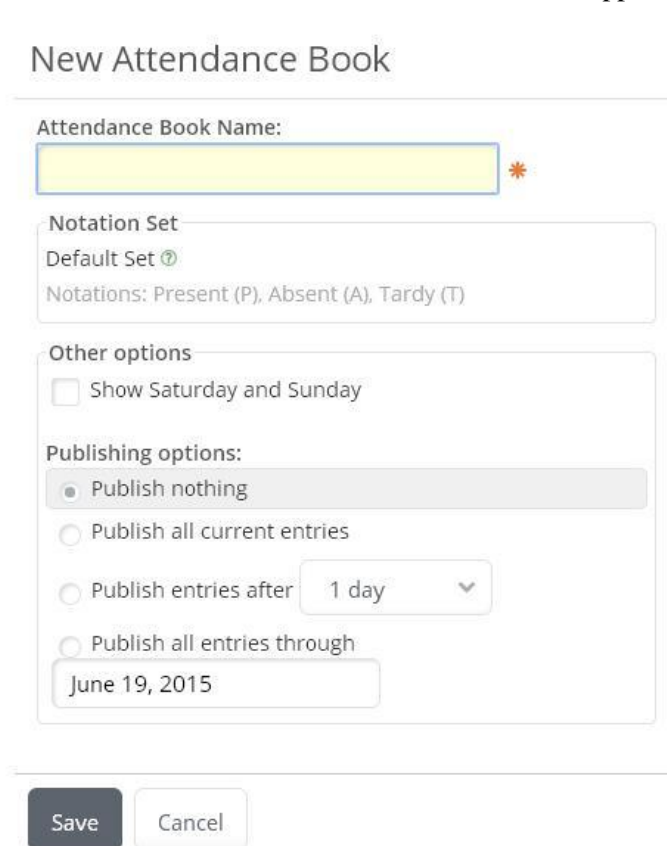
**Figure 2.** Adding content in the course Informatika in Litmos LMS

**4. Haiku LMS**

It is an extremely comfortable and functional system for e-learning, which maintains the connection and teamwork. Teachers and authors of e-courses can add educational content in various formats - Web pages and external links to YouTube, Flickr, video and audio files, and integrated web content. Navigation is easy, and the ability to display various statistics provides feedback on assessments and activity of students. Integration with Google Apps and mobile

devices makes it extremely popular and comfortable to work at any time and any place. Haiku virtual pen allows teachers to make notes and comments on students' assessments and homework straight from the browser.

It is easy to group students, teachers and parents and to add them in classes, also to track students' attendance in the courses. Attendance book in Haiku (**Figure 3**) helps teachers to customize their notations for present, absent, and tardy and even write notes-to-self and notes-to-student so that they have a complete record of what happened.



**Figure 3.** Setting an attendance book for the course Biostatistics in Haiku LMS

Haiku LMS also supports standards, gradebook, statistics, integration with Google Apps and integration with other information systems (15).

## CONCLUSIONS

The growing popularity of cloud services and cloud-based LMSs require vendors to provide secure and protected systems to meet consumers' needs. Affordability and pricing plans for each organization is a prerequisite for their competitiveness. The main features that should have such systems concern provision of conducting quality e-learning, communication and collaboration between participants and tools for creating a variety of learning resources and activities.

Choosing the most appropriate cloud-based LMS is one of the conditions for providing effective and attractive e - learning that satisfy organization's and learners' needs.

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