

Distance Learning (LMS and Virtual Classroom)

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1. Introduction

Many organizations work in a dispersed environment and traditional classroom education sessions may incur prohibitive travel costs and/or scheduling conflicts. Distance Learning Offerings can provide you benefits beyond standard classroom education. Different formats give you more flexibility in delivery options:

- Virtual Classroom: Bridging geographic regions between learning requirements and delivery.
- E-Learning: Self-paced learning, independent of geographic location and time.
- Distance Learning: online self-paced learning with instructor facilitation, independent of geographic location and time.

2. Overview

This section state more information about the two main components of distance learning in more details.

2.1 Virtual Classroom

In a virtual classroom, various communication channels are available for the live interaction between the participants and instructor. These involve voice, video, instant messaging, whiteboard, status icons, question & answer chat and webcam (optionally, for live video).

Using a Virtual Classroom provides various benefits:

- Bring together participants from different geographical locations.
- No expenses for travel, hotel & training facilities.
- Suitable for teaching deliverables on short notice (i.e. short modules for a small topic).
- All types of digital media can be integrated (videos, podcasts, screen capture, animations, PowerPoint etc).
- Interaction between participants & instructor via application sharing.
- Participants can work with software on systems that are not locally available (such Simulation tools in medical and engineering fields).

Many solutions existing today in the market such as Zoom[1], Cisco Webex[2], BigBlueButton[3] and WizIQ[4].

Generally, the main two services of Virtual Classroom are:

- The ability to organize and hold e-Conference sessions, with multiple students participating through audio and video
- Online whiteboard functionality, so instructors and students can create and share writings and drawings in real time

2.2 Learning Management System (LMS)

Which is also known as online learning and is formally defined as: the use of ICT technologies to design, deliver, select, administer, and extend learning.

An LMS is a software platform for delivering learning material online. In addition, it gives you tools to manage training and development, increase learner engagement, and build a sense of community.

A Learning Management System is a software-based platform that facilitates the management, delivery, and measurement of an organization's corporate e-learning programs. The powerhouse of a complete learning technology solution, an LMS is a fundamental component of an effective learning strategy.

You can assign content to specific groups of learners in an LMS. The system has tools that let you track how users move through the e-Learning content. It also has tools that let learners interact with the content and each other—which is key. Most learning takes place outside formal educational spaces, where people talk to each other and get a chance to try out knowledge and skills themselves.

Key Features of LMS:

Automated Admin Tasks: Features that allow administrators to automate recurring/tedious tasks, such as user grouping, group enrollment, deactivation, and new user population.

Certifications and Retraining: The LMS should allow for the tracking and management of all courses/certification and retraining activities (e.g., by managing recurring training/continuing education/compliance programs).

Course and Catalog Management: At its core, a learning management system is the central system that holds all e-learning courses and course content. Administrators can easily create and manage courses and course catalogs to deliver more targeted learning.

Content Integration and Interoperability: Learning management systems should support learning content packaged according to interoperable standards.

An LMS can help track a number of learner activities. Formal learning metrics and reports include:

- Course completions
- Course subscription dates
- Last access by user
- Active courses
- Most viewed courses
- Test/assessment scores
- Learning Plan reports
- User activity reports
- Audit Trail reports
- Certification reports

Some reports that can be generated from LMS include:

- Reports on peer review activity
- Reports on activity per channel
- Answer likes and dislikes
- Rating on content contributions (user-generated content)
- Sharing activity
- Content views

The general rule is Virtual Classroom + LMS = Distance Learning.

There are many famous LMS existing in the market/community which include Moodle[5] and Talentlms[6] which provide integration with virtual classroom service. However, this report focuses on virtual classroom solution.

3. Technical Requirements

2.1 System Requirements

System	Description
Headset	Headsets with microphone for improved sound quality are recommended.
Camera	Any compatible with your operating system with latest device drivers installed.
Operating System	Microsoft Windows, Mac OS, Linux, Android and iOS. Make sure you are using one the compatible browsers listed below.
CPU	• Desktop - Intel or AMD processors with 2.0 GHz or above. Note that

	lower-end CPU types may result in poor (lower video resolution) quality. • Mobile/Tablet - Latest models with a fast CPU clocked at 1.4 GHz or above are recommended.
RAM	Minimum 1 GB. 4GB or more is recommended. At-least 100MB of free memory should be available.
Bandwidth	• Video - minimum 300 kbps per stream, Max 1 Mbps (All attendees) • Audio - minimum 50 kbps per stream, Max 100 Kbps (All attendees) • Recording - minimum 3 Mbps, Max 5 Mbps (Instructor/Presenter only) • Screen Sharing - minimum 2 Mbps, Max 3 Mbps (Instructor/Presenter only)
Compatible Browsers	• Desktop - Google Chrome (latest release version) – Recommended • Desktop - Firefox (latest release version) - Recommended • Desktop - Microsoft Edge (latest release version) - Not Recommended • Android - Google Chrome (latest release version) - Recommended • Android - Samsung Internet (latest release version) - Recommended • Android - Opera (latest release version) - Recommended • iOS - Safari (latest release version 11 or above) - Recommended
Screen Sharing	• Chrome - No plugins necessary. • Firefox - No plugins necessary.
Video resolution	from 180p@30fps to 720p@30fps

2.2 Browser Specific Features Supported

Browser	Audio	Video	Recording	Screen Sharing	Whiteboard
Desktop - Google Chrome (latest release version)	Yes	Yes	Yes	Yes	Yes
Desktop - Firefox (latest release version)	Yes	Yes	Yes	Yes	Yes
Desktop - Microsoft Edge (latest release version)	Yes	Yes	No	No	Yes
Android - Google Chrome (latest release version)	Yes	Yes	Yes	Yes	Yes
Android - Samsung Internet (latest release version)	Yes	Yes	No	No	Yes
Android - Opera (latest release version)	Yes	Yes	No	No	Yes
iOS - Safari (latest release version 11 or above)	Yes	Yes	No	No	Yes

4. Existing Solutions

1. Zoom (www.zoom.us)
2. Webex (www.webex.com)
3. WizIQ (www.wiziq.com)
4. BrainCert (www.braincert.com)
5. Bigbluebutton (www.bigbluebutton.org)

Solutions from 1 to 4 are cloud-based, that means, the university just need to get license in order to go live from any computer/mobile/tablet that just has HTML5 WebCTR support in its browser (that famous two are Google Chrome and Mozilla Firefox).

Bigbluebutton is free and open-source platform that provides the same features which are existed in Zoom/Webex and WizIQ.

Zoom/Webex are American products, so they are prohibited from Sudan according to the Sanction policy. That means, the university staff and student need some VPN in order to go live which is not recommended because using VPN make delay on the video streaming and open some security issues and problems.

WizIQ is good solution and has no sanction policy, so it is allowed from Sudan. Also, WizIQ is cloud-based and does not need any extra software or hardware equipments requirements.

5. Comparative Study

5.1 Zoom/Webex Comparison[7]

Feature	Zoom	Webex
Cost	Free – \$19.99/mo. +	Free – \$26.95/mo. +
Participants	Up to 100 Participants	Up to 500 Participants
Support	Online Support for free, phone for paid, Account Manager for Enterprise	Online for free, Phone Support During Business Hours up to 24-7 for Enterprise
Conferencing Features	HD Video, HD Voice, Screen Sharing, Whiteboarding	HD Video, Screen Sharing, Whiteboarding
Web Features	Private & Group Chats, MP4 or M4A Local Recording, Host Controls, Chrome & Outlook Plug-Ins	Multimedia Content Sharing, Local Recording, Host Controls Toll-Free Dial-In
Supported Integrations	Google Drive, Pardot, Dropbox, Eloqua, HubSpot, Infusionsoft & More	Microsoft Office, Google Calendar, Facebook Live & More

6. The On-premise Solution: BigBlueButton

BigBlueButton is a web conferencing system designed for online learning. It is free and open source solution which any institute can download it and install and configure it based on its ICT infrastructure.

BigBlueButton is completely open source and made by a community of dedicated developers passionate about helping improve online learning, for more information please go the official website www.bigbluebutton.org.

BigBlueButton is an HTML5-based web application. Unlike many commercial web conferencing systems that require you to install software, BigBlueButton runs within your web browser. You click a link (such as in Greenlight), your browser runs BigBlueButton and prompts you to join the audio bridge. There is no plugin to download, no software to install. BigBlueButton provides high-quality audio, video, and screen sharing using the browser's built-in support for web real-time communication (WebRTC) libraries.

WebRTC is a standard supported by all major browsers, including Chrome, FireFox, Safari, and Safari Mobile. For best results on desktop and laptops, we recommend Chrome or Firefox. For Chromebooks, we recommend the built-in Chrome browser.

Furthermore, BigBlueButton has many commercial providers that provide hosting and professional services for it, such companies include Blindeside[8], HostBBB[9] and RIADVICE[10].

BigBlueButton can provide a number of concurrent classrooms/sessions in the same time with a maximum 100 concurrent students per session. That means, in order to satisfy the requirements of SIU using BigBlueButton we need to install at least three servers in order to serve 10 to 15 concurrent classrooms/sessions/lectures per day with 100 students as a maximum for each classroom. Next section we state the technical requirements of hosting and running BigBlueButton by SIU. Furthermore, we get a financial price from RAIDVICE company to host and running BigBlueButton according to a annual fees/year.

7. Pricing

Attached are formal pricing quotations from the following service providers:

1 – WizIQ

2 – BrainCert

8. References

- [1] www.zoom.us
- [2] www.webex.com
- [3] www.bigbluebutton.org
- [4] www.wiziq.com
- [5] www.moodle.org
- [6] www.talentlms.com
- [7] <https://www.dgicomunications.com/zoom-vs-webex/>
- [8] <https://blindsidenetworks.com/>
- [9] <https://distancelearning.cloud/>
- [10] <https://riadvice.tn/>