THE IMPLEMENTATION STAGE IS THE ACTUAL COURSE DELIVERY. THE COURSEWARE IS INSTALLED ON A SERVER AND MADE ACCESSIBLE FOR LEARNERS. IN FACILITATED AND INSTRUCTOR-LED COURSES, WHICH INTEGRATE CONTENT WITH E-TUTORING AND COLLABORATIVE LEARNING COMPONENTS, THIS STAGE ALSO INCLUDES MANAGING AND FACILITATING LEARNERS’ ACTIVITIES.

EVALUATING LEARNING ACTIVITIES IS CRUCIAL FOR BOTH SELF-PACED AND FACILITATED ONLINE COURSES. EVALUATION ALLOWS YOU TO ASSESS LEARNERS’ PROGRESS, THE QUALITY AND EFFECTIVENESS OF THE COURSE, AND IMPROVE FUTURE LEARNING ACTIVITIES AND CONTENT.

THIS SECTION WILL PROVIDE AN OVERVIEW OF ONLINE COLLABORATIVE LEARNING ACTIVITIES AND FACILITATION TASKS, AND HOW ASSESSMENT TESTS CAN BE USED TO EVALUATE LEARNERS’ PROGRESS. THE SECTION WILL ALSO REVIEW LEARNING PLATFORMS WHICH CAN HOST YOUR COURSE.
This chapter provides guidance on how to manage and evaluate learning activities. The chapter will introduce the following topics:

- Structure of an online course;
- Online facilitation tasks;
- Using online communication tools, including social media (e.g. blogs, chat, podcast) for e-learning; and
- Evaluating e-learning courses.

8.1 COMPONENTS OF AN INSTRUCTOR LED OR FACILITATED COURSE

Online facilitated and instructor-led courses are usually organized into sessions, which can be daily or weekly, depending on the duration of the course and on learners’ available time.

The following are typical components of an online course:

- Kickoff event
- Pre-course learning activity
- Cycle of learning events
- Final assessment
- Feedback and conclusion
Kickoff event

The kickoff event introduces the course goals and the agenda. It should motivate the participants and provide an overview of the activities and methods that will be used through the course. This event can be an audio conference or a set of e-mails, and it can include a video or a podcast message.

Initial or pre-course learning activity

An initial learning activity can be proposed to participants before the course officially starts. This pre-course activity could be, for example, studying the first interactive lesson. It is very important that the initial learning activity makes a good impression on participants, since it will be their first experience with the course and will help them decide if they like the course or not. This is also a good opportunity for participants to get used to the online learning platform and for administrators to see if there are any technical problems.

PRE-COURSE PREPARATION IN A FACILITATED E-LEARNING COURSE ON ONLINE COMMUNITIES

A week before the course starts, a pre-course session provides a welcome message, the workshop agenda and some preparatory activities.
Cycle of learning events (core)

The course consists of a series of learning activities that can be scheduled on a weekly or daily basis. Learning activities may include self-study as well as a range of individual and collaborative activities, such as:

- **Readings, watching and self-study:** This can include different types of content, such as simple learning resources (documents and presentations), video and audio content and interactive e-lessons.
- **Individual assignments and collaborative project work:** The facilitator asks learners to conduct project work or an assignment, either in a group or individually. Learners also may be asked to comment on each other's assignments. An assignment should be well-structured and followed by a discussion on the strategies used to complete it.
- **Sharing reflections:** Learners can comment and exchange ideas about course activities or contribute to group learning by sharing their knowledge about a specific domain.
- **Asking questions:** Learners can ask specific questions to the facilitator or SME.
- **Discussions initiated by the online facilitator:** The facilitator can ask learners coming from different organizations or contexts to bring concrete examples of how the concepts learned during the course apply to their specific situations.
- **Spontaneous discussions:** Discussions can be initiated by participants. It is important that the system track conversations so that online facilitators can review them afterwards and evaluate participants’ involvement in the course.

**Example of a discussion initiated by the facilitator in an e-learning course on rural finance**

After reading documents on agricultural development and poverty reduction, learners are invited to answer some questions by considering their own country context and personal experiences.
Final assessment

Some e-learning courses include a final assessment of learners and some intersperse assessments throughout the course. Assessments can vary – they can consist of a set of questions (assessment tests) and/or be an evaluation of learners’ final assignments made by the instructor.

Feedback and conclusion

The last session of an online course usually includes the completion of an evaluation survey that will provide course designers and facilitators with feedback from participants. This is a very useful step as it allows designers to improve the course over time. It also gives participants the feeling that designers are interested in making the course more effective.

FEEDBACK AND CONCLUSION IN A FACILITATED E-LEARNING COURSE ON ONLINE COMMUNITIES

Once the course has finished, participants are asked complete an evaluation survey. They also have the opportunity to review course content, access additional resources and listen to the after action review, that is the analysis of what happened during the course and how things can be done better in the future.
8.2 PLANNING AND DOCUMENTING ACTIVITIES

Planning and documenting activities is essential in facilitated and instructor-led courses. Documentation will be used by facilitators as a guide to implement the activities and can be shared with learners at the beginning or throughout the course.

First, a course syllabus needs to be developed which describes session topics and learning objectives.

Example of a course syllabus for an online facilitated course

Based on the course syllabus, a storyboard specifies the activities that will be carried out and the materials that will be provided to learners in each session. In synchronous learning, such as e-conferences or virtual classrooms, special attention must be dedicated to the technology set-up requirements.
A Word document or an Excel spreadsheet can be used to develop the storyboard.

**EXAMPLE OF A STORYBOARD FOR THE FIRST SESSION OF THE COURSE**

<table>
<thead>
<tr>
<th>Title</th>
<th>Dimensions of Food Security</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In our first session we will look at the concept of Food Security and examine its multi-dimensional nature.

- Learning Objectives:
  - understand the broad concept of food security;
  - understand the different dimensions of food security;
  - identify the aspects of your job which relates to these dimensions

In case you didn’t have time to go through Interactive Lesson #1 during the pre-course phase, please do this today as the lesson is fundamental to the course. Don’t forget to introduce yourself in the Introductions forum.

Check the course bulletin for this session [link] sent to you by e-mail for more details.

**Start your Learning Log - Your Learning Log is a place for you to work on your daily assignments and allow for interaction with the class facilitator and your fellow students on your work in progress. Just click on the “Learning Log” item in the left-hand menu and then click the “Add a new discussion topic” button. Title it with your name. You can now make your first post for Assignment #1 (see below). To add to your log, return to your topic and reply to your latest post. Feel free to change the subject line as you go!**

**Assignment #1 - Reflection on your job**

Reflect on what you learned from Interactive Lesson #1 in the pre-course phase, and the links you see between your practical experience and the multi-dimensional concept of food security in your Learning Log. In doing so, indicate how your job relates to one or more dimensions of food security.

Take some time to visit the Learning Logs of at least two other students and make some comparisons with your experience.

Please upload your comments as soon as possible and follow the start of the next session in order to allow other participants the opportunity to read to your Learning Log post.

**Discussion 1: Food Security Dimensions**

For the discussion on Food Security Dimensions and talk on what new insights you gained by reflecting on your job. Let us know if you have questions or comments on the materials you have read, as well as any comments you have on other people’s contributions.

---

**8.3 FACILITATING LEARNERS’ ACTIVITIES**

In collaborative online-learning, a group of participants creates synergy around common learning goals. The online facilitator is responsible for ensuring that this process is organized, stimulating and efficient. The online facilitator performs the following tasks:

- provides information on tasks, deadlines and places to upload or download files;
- accompanies participants during their work by checking workflow and individual or group results, composing working groups and interfering if necessary into group dynamics in case of conflicts or production blockades;
- provides summaries at the end of units or phases;
- answers questions concerning tasks, deadlines or use of learning tools;
- motivates participants to produce, reflect, animatedly exchange ideas and initiate discussions;
- assures links to other partners in the process (e.g. administrator, subject matter expert, technician); and
- organizes the final evaluation of the e-learning event.

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**THE FACILITATOR’S CONTINUOUS PRESENCE**

The online facilitator personalizes the online course, giving pace and rhythm to the learning event. The facilitator is the one who participants approach with any questions; therefore, he or she has to be available throughout the course and respond to questions as quickly as possible so that participants can proceed with their work and remain motivated.

The facilitator’s continuous presence throughout the process is crucial to assure participants’ motivation and reduce abandon rates considerably.
8.4 USING COMMUNICATION TOOLS FOR E-LEARNING

E-learning activities can be realized by using a range of communication tools – both synchronous and asynchronous. Some of these tools, such as wikis, blogs and chats, are called “social media” or “Web2” tools, because they have a strong social component and allow people to work together to create products, such as a project document.

The most common tools are:

- e-mail based tools
- discussion forums
- wikis and other shared writing/editing tools
- blogs
- webcasting
- chat and instant messaging (IM)
- polling
- whiteboard and screen-sharing tools
- application sharing
- audio and video conferences

These tools and their applications in e-learning courses are described below.

Generally speaking, asynchronous tools, such as forums and wikis, are more appropriate for tasks that require reflection and more time to accomplish. Asynchronous discussions are especially valuable where learners are too shy or lack language fluency to collaborate effectively in real time conversations.

However, synchronous tools, like chats or audio conferences, provide higher social presence. For example, in virtual classrooms, learners can use chats to offer comments and answer questions during the presentation.
E-mail based tools

E-mail continues to be the most basic and popular way to communicate over the Internet. It works well in low and high bandwidth situations.

E-mail-based tools allow groups of people to be easily connected for discussions and information exchange. Specifically, mailing lists are used for group discussion and e-newsletters are used for one-to-many communication.

Discussion forums

Discussion forums (also called message boards) are the primary tool for online discussion. They allow a number of participants to hold conversations in the form of posted messages. In other words, participants can communicate at different times by writing comments that remain in the forum for other participants who can read and respond to them. Each forum can contain one or more discussions, which are comprised of one or more posts and replies.

Wikis and other shared writing/editing tools

A wiki is a Web site which can be edited online. Unlike common Web pages, which are created offline and then uploaded to a Web server, wikis are edited “live”. Users do not need any special technical knowledge to modify existing wiki pages or to add new pages.

The administrator of a wiki can specify who may view and edit the site or subsections of the site. The administrator can make the wiki open for anyone to use and edit, or restrict editing permissions to registered users.

How e-mail-based tools can be used for e-learning

- E-mail is the simplest mechanism for direct, one-to-one communication between the facilitator/instructor and learner. E-mail is used for asking and answering individual questions rather than for questions of general interest. If responding is optional and the subject is not critical, it is better to post the question in a forum. Also, e-mail can be used for responses which might embarrass the recipient if posted in a public space.
- Newsletters can be used for broadcasting a message to the group, such as to announce a change or an event to all participants (e.g. urgent class announcements and reminders, approaching tests, imminent deadlines, schedule changes). Only the instructor should broadcast messages this way, and should not do so too often.
- Mailing lists can be used for discussions and sharing documents in small groups (especially for those with limited Internet access). They facilitate group project work and collaborative activities.

How discussion forums can be used for e-learning

- Forums are used for topic-specific discussions, case study collaborative work, post-class commentaries, etc.
- Both learners and facilitators/instructors can leave messages, read and reply.
- Compared with mailing lists, discussion forums can be more appropriate for large groups as participants can freely joint discussions by connecting to the learning platform instead of receiving many email messages.

How wikis can be used for e-learning

Wikis can be used by learners for collaborative work on the same document or to share ideas and resources on a topic.
Blogs

A blog (shortened from Web log), is a tool that allows people to share, access and easily update information, without having any knowledge of computer programming. Blogs were created to present content as a simple list of entries, just like a diary.

A blog allows users to easily post content onto a Web site on a regular basis, in a standardized format. The posted information forms a commentary or stream of frequently updated ideas.

The key element of a blog is that it gives a voice to the blogger (individual or group) and allows a secondary “voice” from those who comment.

What is the difference between a blog and a wiki?

Both blogs and wikis allow users to publish Web content “live” via a Web browser, without any knowledge of programming languages.

The difference between them is that:

- blogs allow only a simple “diary-like” format; while
- wikis do not impose any particular page structure, and allow users to create new pages and edit existing ones.

How blogs can be used for e-learning

> Blogs allow sharing, accessing and easily updating information. Learners can use them for submitting their own assignments and for commenting on those of the other participants.

> Participants can also use blogs as learning logs – a place for reflecting, gathering ideas and having smaller conversations among themselves. Blogs are a place to help participants “make sense” of what they are learning.

Webcasting

The term “webcasting” refers to audios and videos sent from a single source to multiple passive receivers. The typical application is the video lesson, where an expert talks to many learners simultaneously, without any interaction. Webcasting uses streaming media to transmit audio and video over the Internet. However, recorded webcasts can be provided for asynchronous use.

Podcasts are audio programs that are broadcast over the Internet. They are audio files (such as MP3 or .wav formatted) which can be downloaded to a compatible digital audio player or a computer.

How webcasting can be used for e-learning

> Videos can be used by the facilitator to provide content (e.g. short video lessons where an expert talks), motivation or orientation. They are used to show moving objects or processes (e.g. assembling components of a machine), present real people talking (e.g. the instructor) and deliver emotional messages.

> Podcasts can be used by the facilitator to provide orientation and motivation. Audio can bridge literacy gaps, and the relatively small file sizes are easier to transmit in low bandwidth situations than video files.
EXAMPLE OF PODCASTING FROM THE FACILITATED COURSE “KNOWLEDGE SHARING FOR YOUR WORK”

For example, the following podcast is used at the beginning of a facilitated course to provide background information.

Some Background Information
Listen to this podcast with Chase Palmeri from the International Fund for Agriculture Development for some background information on this workshop.

Podcast 1: Chase Palmeri on how this workshop came about.
- Click here to listen to podcast

EXAMPLE OF A VIDEO LESSON FROM THE FACILITATED COURSE “KNOWLEDGE SHARING FOR YOUR WORK”

In the same course, a short video is used to introduce course topics.

Mini Lesson #1: Knowledge
In this video Patrick Lambe of Straits Knowledge talks about the different types of knowledge. Although he talks about them in the context of a Knowledge Audit, don’t worry about what a Knowledge Audit is for the moment. Pay attention to the six types of knowledge that he describes.

Please click on play to watch the video (right mouse click on the video for full zoom). If you are using Mozilla Firefox as your browser, you will need to save the video onto your computer first before you can view it. Save this video.

Alternatively, go to this website to view the video - http://plambe.blip.tv/file/2045199/
Chat and instant messaging

Instant messaging (IM) is one of the most popular applications on the Web. It allows two or more people to exchange text-based messages in real time, using a Web or desktop application.

A group of people can start a text conversation online in a space commonly called a “chat room”. In a typical chat session, everybody sees all the messages. However, some chats allow private messaging between two session members.

Polling

Instructors can ask learners to respond to a displayed poll, usually consisting of a question and two or more possible answers.

How polling can be used for e-learning

- Polls can be used by the facilitator to collect learners’ opinions by asking them to vote on issues and make choices concerning course activities.

Whiteboard and screen-sharing tools

Whiteboards allow instant visual communication. They allow instructors to display content and learners to interact with that content.

How whiteboards can be used for e-learning

- Instructors can use whiteboards for synchronous presentations, when content is changing right up the last minute and when the visual component is important (e.g. to brief about activities). The presentation can also been recorded.
- Whiteboards allow two-way interaction. Learners can complete a drawing started by the instructor, make annotations on specific parts of the screen, vote visually by indicating their choice on a graphic, write their names and arrows in a map, etc.
Application sharing

Application sharing lets the presenter share programs, windows or screens with learners. Learners can watch the presenter's actions and can take control of the display with permission from the presenter.

How application sharing can be used for e-learning

- Instructors can use application sharing to teach a software procedure.
- Application sharing should be used only for demonstrations which require simple movements, so as to not lose fluidity in the presentation.

Audio and video conferences

Audio and video conferences are audio and video sessions between two or more users at different locations, in real time. They are primarily used for meetings and project updates.

Some Instant Messaging applications incorporate video and voice conversations. Voice over Internet Protocol (VoIP) applications and services allow users to make high-quality, low-cost calls over the Internet. One of the most popular programs using VoIP is Skype. Skype allows free calls to other Skype members connected by their computers, and charges a small fee for calls to regular phones.

Telephones ensure better audio quality and are more reliable; VoIP is cheaper and easier when there are more than a few people talking.

How audio and video conferences can be used for e-learning

- Audio conferences can have great application in mobile learning (i.e. through cell phones).
- Audio conferences are well-suited for training topics where speaking and listening are crucial (e.g. language skills courses).
- Recorded audio conferences can be made available as podcasts.
- Video conferences emulate face-to-face experience and human presence.
- Video conferences are particularly appropriate for training topics where visual clarity is crucial (e.g. medicine).
- Video conferences require very fast network connections.
Virtual classroom

A virtual classroom mimics a traditional instructor-led classroom by integrating different types of synchronous tools, such as whiteboard, chat, audio conference or application sharing.

Most virtual classroom tools incorporate similar functions, although the screen interface may be different.

**Example of Virtual Classroom Functions**

The largest portion of the screen is devoted to the whiteboard, on which the instructor can project slides and learners can write and draw using text and drawing tools.

On the left side of the screen, there is a participant window that shows the name of everyone attending the session, a set of tools to use for interaction (comparable to a traditional classroom, such as for raising hands), the instant messaging window to send messages to other learners and the instructor and the audio control for the microphone and speaker.
8.5 COURSE EVALUATION

As already stated in chapter 4, the evaluation strategy should be defined at the design phase of your e-learning project.

What is the purpose of the evaluation?

Evaluation can be done to accomplish specific evaluation purposes. First, you should decide if you want to evaluate the course during the development stage to improve it before it is finalized, or do an evaluation at the end of the course to measure its effectiveness, or examine a past course to see if it is still valid and can be reused in a new context.

In other words, you may want to evaluate a course:

> during the development stage, to improve instructional courses or products (formative evaluation);
> during or immediately after the implementation stage, to measure the effectiveness of education, training and learning (summative evaluation); and
> some time after the course has been implemented, to understand if it is still valid or needs to be updated or modified (confirmative evaluation).

Case study

A formative evaluation of the first IMARK module entitled “Management of Electronic Documents” was undertaken by FAO during the later stages of the development phase of the module. The evaluation focused on usability, media, content, and instructional design. Questionnaires with open- and closed-ended questions were submitted to learners, SMEs and IDs. The results of the formative evaluation were used to improve the module prior to the release of version 1.0.

After the first IMARK module had been available at least for two years, FAO and the Technical Centre for Agricultural and Rural Cooperation (CTA) undertook a confirmative evaluation. The evaluation focused on the uptake and use of the first IMARK module and used questionnaire-based surveys of learners, with additional inputs from distribution partners. The results of the confirmative evaluation were used to update the content for developing a new version of the module.

What can be evaluated?

According to the Kirkpatrick model, evaluation can encompass four levels:

> learners’ reactions
> learning
> behaviour
> results

Evaluating learners’ reactions means understanding how those who participate in the program react to it, if they participate actively and if they like the course. This can be measured through questionnaires and surveys, which are usually submitted to learners at the end of the course. In facilitated e-learning, learners’ participation is monitored by the facilitator throughout the course period.

Evaluation (or assessment) of learning measures the achievement of intended learning objectives. Depending on the type of course, this can imply that participants have increased knowledge, developed skills, and/or changed attitudes as a result of attending the course. Learning can be assessed through direct observation, assignments and tests.

44 A fifth level of Kirkpatrick’s evaluation model, the Return on Investment (ROI), has been introduced by Jack J. Phillips. According to Phillips, the ROI is a comparison between benefits and costs: ROI = Net Programme Benefits/ Programme Costs. See J.J. Philips (1997). Return on Investment in Training and Performance Improvement Programs, Gulf Pub Co.
According to the type of learning objectives, different methods can be used to evaluate learning.

Changes in attitudes and development of relational skills can be measured through interviews, surveys or direct observation of participants’ behaviour.

Thinking and cognitive skills can be measured through assessment tests. Assessment tests can consist of sets of questions or assignments designed to verify the achievement of a specific objective or the mastery of a given skill.

Assessment tests can be used for different purposes:

- **Prerequisite tests**: used to verify if learners have the minimum required knowledge to participate in a certain learning course.

- **Pre-assessment tests (or entry tests)**: used to assess a learner’s knowledge and skills before beginning a course, in order to personalize learning activities.

- **Diagnostic tests**: used to assess the achievement of a unit’s learning objectives after the completion of a specific learning unit.

- **Post-assessment test**: used to assess the achievement of the course’s learning objectives after the completion of the entire course.

- **Certification tests**: used to verify specific skills and knowledge inside the organization and are not necessarily related to a learning course.

In self-paced e-learning, assessment tests mainly consist of “closed-ended” questions associated with response options. The most frequently used question formats include: multiple choice; multiple responses; matching; ordering; fill-in-the-blank; and short answer/essay. Learning platforms often include editors to create tests, questions and tools for reporting results.

In facilitated and collaborative e-learning, “closed-ended” questions are integrated with different types of assignments which are carried out during and/or at the end of the course. Questions and assignments are evaluated by the facilitator or instructor. This is often associated with continuous monitoring of individual and group activities during the course.

Evaluating **behaviour** means understanding the extent to which participants’ behaviour has changed because of the training program: for example, if they use the acquired knowledge and skills on the job or in other practical situations. This can be done by observing learners’ performance on the job.

Finally, evaluating **results** consists of identifying the final results that occurred in the organization because the participants attended the programme. The final results can include increased production, improved quality, decreased costs, and fewer accidents.

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45See chapter 6 for guidance on how to develop practice and assessment tests for self-paced e-learning.
8.6 IN SUMMARY

KEY POINTS FOR THIS CHAPTER

- Online facilitated and instructor-led courses can include the following components: a kickoff event, core learning activities (e.g. self-study, online discussions, group work, virtual classroom), final assessment, conclusion and feedback.

- A course syllabus needs to be developed which reports sessions and learning objectives. A set of storyboards should detail the activities that will be carried out in each session.

- Activities can be realized by using a range of tools, both synchronous and asynchronous, which are selected according to learners’ preferences and technical requirements. Some of them, such as wikis, blogs and chats, are called “social” or “Web2” tools.

- Evaluating learning activities is crucial for both self-paced and facilitated online courses. Evaluation allows you to assess learners’ progress, the quality and effectiveness of the course, and improve future learning activities and content.
9. LEARNING PLATFORMS

This chapter illustrates the different types of learning platforms which can be used to host e-learning courses and make them available to learners. It includes the following topics:

- Different types of learning platforms (VLE, LMS and LCMS);
- Proprietary and open-source learning management systems; and
- Solutions for limited Internet connectivity.

9.1 WHAT ARE LEARNING PLATFORMS?

A number of organizations and educational institutions use learning platforms to deliver and manage their learning processes.

A learning platform is a set of interactive online services that provide learners with access to information, tools and resources to support educational delivery and management through the Internet.

There are a variety of learning platforms with different levels of complexity, but their most important features include:

- learning content management – creation, storage, access to resources
- curriculum mapping and planning – lesson planning, personalized learning experience, assessment
- learner engagement and management – learner information, progress tracking
- tools and services – forums, messaging system, blogs, group discussions

Learning platforms are usually referred to as virtual learning environments (VLEs), learning management systems (LMSs) or learning content management systems (LCMSs). These terms are often used interchangeably, and despite differences between these platforms, they have many features in common.

Virtual learning environments, or VLEs, are used to simulate traditional face-to-face classroom activities and facilitate teaching and learning with a strong collaborative component. Examples of VLEs are Moodle and Blackboard.

A learning management system, or LMS, solution facilitates delivery and management of all learning offerings, including online, virtual classroom and instructor-led courses. It automates the learning course and easily delivers training, manages learners and keeps track of their progress and performance across training activities, which reduces administrative overhead.

Clara has to choose the platform for delivering the course.

She has heard about Moodle, an open-source online platform that is widely used, but she would like to know more about what Moodle and other learning platforms can offer to her organization to support the delivery of e-learning courses.

Clara, training manager

How will we make the courses accessible to learners?

File:///menu.png

http://moodle.org/

http://www.blackboard.com/
Another type of platform – learning content management systems, or LCMSs – focuses mainly on creating e-learning content. In other words, developers and administrators create content material, such as articles, tests, games, video and small units of digital content (content chunks), which then are rapidly assembled, reused and tailored into different courses according to learners’ needs. LCMSs reduce development efforts and allow digital content to be easily repurposed.

Both LMSs and LCMSs are designed to manage course content and track learner performance and learning objects, but they differ in their purposes. While LMSs manage and track online activities, classrooms and all sources and events, LCMSs do not manage blended learning, but only the digital content, even at its lowest levels.

These differences are summarized in the table below.

<table>
<thead>
<tr>
<th>Benefits who?</th>
<th>LMS</th>
<th>LCMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>All learners; organization</td>
<td>Content developers; learners</td>
<td></td>
</tr>
<tr>
<td>who need personalized content</td>
<td>who need personalized content</td>
<td></td>
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<tr>
<td>Primarily manages</td>
<td>Learner performance; learning</td>
<td></td>
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<tr>
<td></td>
<td>requirements; learning programs</td>
<td></td>
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<tr>
<td></td>
<td>and planning</td>
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<tr>
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<td>Yes</td>
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<tr>
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<tr>
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<td></td>
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<tr>
<td>Tracks results</td>
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<td>Yes</td>
</tr>
<tr>
<td>Supports learner collaboration</td>
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<tr>
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<tr>
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</tr>
<tr>
<td>Schedules events</td>
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<tr>
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</table>
It is difficult to draw a fine line between these platforms. New generations of platforms are modular – they consist of “plug-ins” and “add-ons”, software components that extend platforms’ basic functionalities. For example, some LMS applications integrate plug-ins that extend performance management capabilities and support job competency databases, while others include content management capabilities for central storage of all forms of content (e.g. media assets, learning objects). Web 2.0 add-ons add social networking functionalities.

Finally, enterprise resource planning software companies (such as Oracle or SAP) tend to extend their human resource offerings with LMS components.

**Hosted vs. internally handled LMS**

LMS platforms, both proprietary and open-source platforms, can be hosted externally by a vendor or handled internally within the organization’s IT structure.

The table below shows some characteristics of both service models to consider when choosing a deployment modality option. More often than not, the chosen modality depends on whether an organization’s policy is flexible or strict.

<table>
<thead>
<tr>
<th>LMS licence cost</th>
<th>INTERNALLY HANDLED LMS</th>
<th>HOSTED LMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LMS configuration and deployment</td>
<td>internally on-premises</td>
<td>off-shore hosted on the vendor’s server</td>
</tr>
<tr>
<td>Web site for LMS installation</td>
<td>required</td>
<td>not required, installed on the vendor’s site</td>
</tr>
<tr>
<td>Dedicated internal IT team</td>
<td>required</td>
<td>not required, the vendor’s IT team handles all IT activities</td>
</tr>
<tr>
<td>Technical knowledge required</td>
<td>requires substantive technical/programming knowledge</td>
<td>limited</td>
</tr>
<tr>
<td>IT support cost</td>
<td>high</td>
<td>low</td>
</tr>
<tr>
<td>Hardware &amp; software cost (cost of scalability, reliability, fail over)</td>
<td>high, especially in case of stand-alone setup</td>
<td>low, costs are shared across customers</td>
</tr>
<tr>
<td>Maintenance &amp; upgrade cost</td>
<td>high</td>
<td>much lower</td>
</tr>
<tr>
<td>LMS customization time</td>
<td>long</td>
<td>short</td>
</tr>
<tr>
<td>LMS implementation policy</td>
<td>strict</td>
<td>flexible</td>
</tr>
</tbody>
</table>

### 9.2 PROPRIETARY VS. OPEN-SOURCE LMS

Learning platforms exist as proprietary software or open source:

> Proprietary LMSs are licensed under exclusive legal right, restricted from modification, further distribution, reverse engineering and other uses. They are closed-source with licence costs per user.

> Open-source LMSs instead work under the terms of the GNU General Public License. The licence is intended to guarantee freedom to share and change the program and ensures that it is free for all users.
Open-source software packages in e-learning include LMS and LCMS platforms, as well as course and media elements authoring tools. Benefits of open-source software packages include:

- free distribution and licensing to unlimited users;
- modification and derived works are allowed;
- users worldwide are engaged in their development (i.e. community participation);
- ability to run on multiple platforms; and
- better and easier communication with other open-source languages, platforms and databases.

LMS open-source initiatives are usually backed by non-profit associations and consortiums, such as: LRN consortium,\(^48\) Claroline Consortium,\(^49\) and the Sakai Foundation.\(^50\) The associations are committed to innovation in education technology through open-source principles and provide a base for software development and quality.

The open-source LMS initiative is constantly evolving with new reliable, interoperable and extendable packages and trends.

The basic “core system files” are easily accessible and offered to the community licence-free. This open model architecture means that developers and contributors can customize a platform according to the client's needs or develop new software components, known as modules and add-ons, to extend basic system functionalities. Many plug-ins and add-ons that enhance platforms are freely downloadable. For instance, Moodle offers themes that enable users to personalize the look and feel of the Moodle platform.

On the other hand, some code extensions are suitable only for clients with specific needs. As such, they are commercial and not covered under a free licence. For instance, a core community edition of the “eFront” platform has been significantly extended with various administrative and report tools. The newly extended version led to the creation of two commercial editions, Education and Enterprise.

Besides numerous advantages related to code modification and customization, open source packages have a few drawbacks. Although there is no licence fee, certain cost elements are usually ignored. First of all, open-source programs require a dedicated IT team with advanced technical and programming skills to handle set up, installation and customization (e.g. installation of database and operating system). In some cases, the total running cost of open-source LMS, including administration, support and maintenance costs, can even exceed the initial licence cost of proprietary LMS software.

<table>
<thead>
<tr>
<th>PROPRIETARY LMS</th>
<th>OPEN-SOURCE LMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence fee</td>
<td>cost-based</td>
</tr>
<tr>
<td>Source code</td>
<td>encrypted, developed by a professional developed team</td>
</tr>
<tr>
<td>Development team</td>
<td>professional developers</td>
</tr>
<tr>
<td>Ownership</td>
<td>owned by vendor</td>
</tr>
<tr>
<td>Ease of LMS implementation and deployment</td>
<td>fairly easy</td>
</tr>
<tr>
<td>Client support/maintenance services</td>
<td>dedicated support services provided by vendor</td>
</tr>
<tr>
<td>Support/maintenance cost</td>
<td>included in licence</td>
</tr>
<tr>
<td>Risk of product discontinuation</td>
<td>yes</td>
</tr>
<tr>
<td>Ease of customization</td>
<td>performed only by a vendor's developers</td>
</tr>
<tr>
<td>Release process</td>
<td>slow</td>
</tr>
</tbody>
</table>

\(^48\)http://dotlm.org/about/index
\(^49\)http://www.claroline.net/consortium/consortium.html
\(^50\)http://sakaiproject.org/sakai-foundation
Based on their underlying instructional approaches, open-source LMS packages may be more suitable for education/academia, governments or business/corporate. In addition, some of them integrate social learning features that include chats, forums, RSS feeders and wikis (e.g. Sakai).

Every year, leading experts in technology and market research (e.g. Brandon Hall Research, Bersin and Associates or Forrester Research) issue the LMS knowledge base, with in–depth profiles of the whole e-learning industry. Such resources offer structured and proven methodologies and advisory tools that help organizations/institutions identify their own requirements when selecting an appropriate LMS.

### 9.3 MOODLE AND OTHER OPEN-SOURCE LMS SOLUTIONS

Moodle is a widely used, free of charge, open-source learning platform.

Moodle promotes a collaborative approach. It was originally made for education, training and development environments to help educators create online courses with a focus on interaction and collaboration, although lately it has been extended to business settings as well.

Moodle has more than one million users and almost 50,000 registered sites around the world. Numerous modules extend its functionalities (e.g. graphical themes, authentication and enrolment methods, games and activities and resources). Moodle runs without modification on Unix, Windows, MacOS and many other systems that support PHP scripting language and a database compliant with SCORM and AICC standards. However, its installation requires certain technical proficiency of PHP technology.

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**MOODLE PLATFORM FOR “COLLABORATE AND LEARN AT FAO - VIRTUAL WORKSHOP: INTRODUCTION TO ONLINE COMMUNITIES”**

Prior to the start of this course, participants are given access to the course space.

In the central area, where the course is actually taking place, participants find a list of tasks and activities to do. In this case, they are invited to introduce themselves or make their first postings to get used to the whole area. On the left, they are given access to the tools, such as Discussion Forum, Cybrary, Case studies Wiki and Learning logs, and can listen to the podcasts or take self-paced courses. Those listed in the section “People” are all workshop participants.

“The Weeks” (top right) shows a course structure divided by weeks. Each week has its own agenda and activities.
In addition to Moodle, there are other open-source LMS solutions:

**Docebo** ([http://www.docebo.org/doceboCms/](http://www.docebo.org/doceboCms/)) - Three versions: Community (basic), Reseller, Enterprise. Customizable according to clients’ specific didactic needs (i.e. cognitivism, constructivism and blended learning). Used in large companies and across the sectors: finance and insurance, health, government, universities and schools.

**eFront** ([http://www.efrontlearning.net/](http://www.efrontlearning.net/)) – Three versions: Community (basic), Educational, Enterprise. Visually attractive and highly expandable with various modules. Educational and enterprise extensions are enriched with more powerful administration, performance management and reporting features.


**Claroline** ([http://www.claroline.net/](http://www.claroline.net/)) – More for educational than corporate environments, this system allows teachers to build online courses and to manage learning and collaborative activities on the Web. Translated into 35 languages, it has a large worldwide users’ and developers’ community.

**ATutor** ([http://www.atutor.ca/](http://www.atutor.ca/)) - The “A” stands for Accessible and it has excellent support for key accessibility standards (Atutor, Acontent, ATutor social). ATutor social is a social networking module that allows ATutor users to connect with each other. They can gather contacts, create a public profile, track network activity, create and join groups and customize the environment with any of the thousands of OpenSocial gadgets available all over the Web. ATutor Social can be used as a stand-alone social networking application.

**ILIAS** ([http://www.ilias.de/](http://www.ilias.de/)) - Provides testing and assessment tools as well as collaboration tools (e.g. chat and forums) and distribution technologies (e.g. RSS and podcasts). Learners can personalize their desktops and collect all resources needed to fulfill the daily learning tasks. The personal desktop features News, Personal Messages, Learning Resources, Personal Notes, Bookmarks, External Web Feeds and other information. A learner can rearrange these blocks of information according to his or her needs. Content management and authoring is limited to xml modules, glossaries and wikis.

**OLAT** ([http://www.olat.org/website/en/html/index.html](http://www.olat.org/website/en/html/index.html)) – While it was developed by the University of Zurich, especially for public institutions such as universities, academies or colleges, it is also suitable for other businesses. It is Java based, Web 2.0 enabled, user-friendly and flexible; however, it is not easy to set up because of quite complex server requirements. It can handle more than 700 students simultaneously on one standard Linux server. If higher performance requirements for up to 30 000 users are needed, OLAT’s fully scalable system allows it to be deployed on multiple servers. Users are able to set their own personal home portal, course structure and navigation. It contains an editor for simple OLAT courses with OLAT course elements. Won the “Leadership Award 2009” in the category “Best Open-source Learning Platform”.

**Sakai CLE** (Collaboration & Learning Environment) ([http://www.sakaiproject.org/](http://www.sakaiproject.org/)) – This is a robust system for education based on collaboration and open sharing of knowledge. It includes features of LMSs and VLEs and contains a full set of “core” capabilities (e.g. blogs, calendar, forums, glossary news, wiki, RSS reader). Users can easily create rich and collaborative documents and share them with others using integrated Google-powered tools (Docs and Google Apps). Used by Yale, Stanford, Boston, Oxford, Berkeley and Cambridge universities and more than 350 small private and public colleges and universities.

**.LRN** ([http://www.dotlrn.org/](http://www.dotlrn.org/)) – This is one of the world’s widely adopted, open-source, full-featured applications for rapidly developing Web-based learning communities. It supports a variety of learning styles, ranging from traditional structured learning to group collaboration. Its customizable layout allows users to personalize learning space. It is built as a platform for “learning communities” rather than a narrow system for “course management” or online learning.

**open Elms** ([http://www.openelms.org/](http://www.openelms.org/)) – This is flexible and robust, designed for corporate business. It is a complete e-learning solution which contains Jackdraw, a free e-learning creator. Courses created with this tool can be published onto any SCORM compliant Learning Management System.
## Functionality matrix of open-source LMS (core packages)

<table>
<thead>
<tr>
<th>FUNCTIONAL AREA</th>
<th>DOCEO</th>
<th>EFRONT</th>
<th>DOKEOS</th>
<th>CLAROLINE</th>
<th>ATUTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multilanguage support&lt;sup&gt;16&lt;/sup&gt;</td>
<td>✓</td>
<td>✓</td>
<td>partly</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Easy to setup</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Programming language</td>
<td>PHP</td>
<td>PHP</td>
<td>PHP</td>
<td>PHP</td>
<td>PHP</td>
</tr>
<tr>
<td>Course management&lt;sup&gt;17&lt;/sup&gt;</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Reporting tools</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Content management&lt;sup&gt;18&lt;/sup&gt;</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Authentication</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>SCORM 1.2 compliance</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Group setup and management</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Course authoring</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Communication tools&lt;sup&gt;19&lt;/sup&gt;</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Modular</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Online assessment tools</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Enterprise or Pro edition&lt;sup&gt;20&lt;/sup&gt;</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

<sup>16</sup>Interface is available in many languages
<sup>17</sup>Create, delete, modify course, assign it to learner, groups, create course category
<sup>18</sup>Manage/import/upload content
<sup>19</sup>Blogs, wikis, instant messaging, podcasting, etc.
<sup>20</sup>Commercial versions of LMS
<table>
<thead>
<tr>
<th>ILIAS</th>
<th>MOODLE</th>
<th>OLAT</th>
<th>SAKAI</th>
<th>LRN</th>
<th>OPEN ELMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>PHP</td>
<td>PHP</td>
<td>Java</td>
<td>Java</td>
<td>OpenACS</td>
<td>ASP/Java Script</td>
</tr>
<tr>
<td>✓</td>
<td>✓</td>
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<tr>
<td>limited</td>
<td>limited</td>
<td></td>
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<td>✓</td>
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<td>✓</td>
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</tbody>
</table>

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9.4 SOLUTIONS FOR LIMITED OR NO CONNECTIVITY

Faced with technical constraints, such as very limited or no online access and an unreliable supply of electricity, organizations and institutions need to evaluate those solutions that will allow users to work with a lack of connectivity and limited information and communication technology (ICT) infrastructure.

Local-area network-based LMS

In cases with limited or no connectivity, a potential solution is to run an LMS on a local-area network (LAN) in the client-server architecture. In this model, a server provides resources or services, while client PCs request and retrieve content from the server via a computer network. In some rural secondary schools in Tanzania, students used a LAN configuration without Internet to access e-learning resources from their client PCs where the LMS application was installed. The local server would receive content updates from removable storage devices, like CD-ROMs, DVDs or memory sticks.

A constraint of using this approach is that it requires knowledge of client-server architecture.

Offline player possibilities for LMS

Offline players are another potential solution in cases with limited or no connectivity. These applications can download and play offline course content and track learners’ progress and preferences. Learners can take the course without having to access the Internet. Once an Internet connection is established, it automatically synchronizes with the LMS and updates data. The offline players that have been tested are: Meridian, blackboard Agilix backpack and Harbinger.

M-learning technologies

E-learning facilitated by hand-held devices, such as mobile phones, Palms, pocket PCs and personal digital assistants (PDAs), is called “m-learning”. These technologies offer communication channels via e-mail, access to the Internet and voice and text messaging. Learning and teaching via mobile devices also is growing rapidly because they offer certain advantages (e.g. they are cheaper and easier to carry and handle than desktops and provide instant access to educational material). Learners can share lessons plans, exchange advice, opinions and tips or immediately apply their knowledge, such as in on-the-job and just-in-time training.

Interest in “anytime” and “anywhere” learning via mobile devices is growing rapidly in developing countries:

> In West Africa mobile learning solutions are being spread to schools, corporations and government by a mobile dealer, Ad-Connect. The Ad-Connect platform that supports voice, pictures, text and audios was used in schools and pilot projects with Central University College in Ghana and University Nsukka in Nigeria. The system enables teachers to publish lecture notes, examinations and other material and to get feedback from learners directly.

> Health workers in remote areas of Kenya use mobile devices to obtain information about difficult cases of HIV/AIDS. They download tests and reference materials and go to the forum to make postings and exchange experiences with their colleagues.

41http://www.waset.org/journals/waset/v54/v54-139.pdf
42http://www.meridianksi.com/products/mobile_lms/
44http://www.harbinger-systems.com/offlineplayer.htm
45http://www.mobileafrica.net/2787.htm
In three districts in Punjab\(^1\) province in Pakistan, participants, mostly women, engaged in a very interesting mobile-enabled post-literacy pilot project to reinforce their newly acquired literacy skills. After completing a basic literacy course, they were given mobile handsets and received nearly 600 SMS messages. They had to read messages, copy them into their workbooks and read them repeatedly. Finally, they would reply to the messages and answer questions. The whole programme was very motivating and their skills were significantly improved.

The Commonwealth of Learning launched the LIVES (Learning through Interactive Voice Educational System)\(^2\) education system to deliver learning components via voice to multiple users over the existing telephony/mobile infrastructure. The system is able to assess user performance via stored numeric feedback from the users. It has full working LMS and LCMS features able to deliver and manage education materials and manage student profiles and progress.

Initially launched in Nigeria and Tanzania, Vodacom’s mobile social network, The Grid,\(^3\) has expanded globally, offering mobile chat and content-sharing features to their users and learners.

Despite the potential and capabilities of mobile devices, m-learning experiences are currently limited and fragmented because of some technological and pedagogical issues:

- Their small size makes them easy to lose and damage.
- It is difficult to input or scroll because of the small user interface. There is a lack of technical standards across platforms and mobile devices; e-learning is easier to deliver when mobile devices are more standardized.
- There is a lack of appropriate instruction strategies.
- No tools exist to evaluate the learning process.
- Telecom infrastructure is undeveloped.
- The cost of mobile devices can be a barrier to widespread use.

Approaches to working around these constraints include the following:

- Optimize and downsize applications and Web sites for portable devices; eliminate multicolumn design with simple navigation and no graphics.
- Adopt adequate instructional approaches and make m-learning more collaborative and learner-centred. Because e-learning content created for desktop devices cannot be delivered via mobile devices, m-learning is suitable for accessing knowledge, reminders, reviews and support; learning through play; or inquiring or constructing knowledge. Learners should be allowed to access and create content and communities of practitioners to exchange tips and best-practice solutions.
- Elaborate evaluation and assessment tools in order to understand the learning process.
- Bridge the Internet divide and lack of telecom infrastructure by using the initiative and efforts of mobile operators in the region. For example, the leading mobile operator in Angola offers quicker Internet access through Opera Mini software, and in Nigeria, Nokia’s Ovi Life Tools give access to a wide range of healthcare, agriculture and education services and information, such as Learn English, in which learners acquire general knowledge or access exam results.

\(^1\)http://www.unesco.org.pk/education/documents/Project%20Brief%20Paper_ict.pdf
\(^2\)http://lives.cs.ubc.ca/
\(^3\)http://www.thegrid.co.za/
Learning platforms are used by organizations and institutions to deliver and manage their learning processes. A learning platform is a set of interactive online services that provide learners with access to information, tools and resources to support educational delivery and management.

Learning platforms are usually referred to as VLEs (virtual learning environments), LMSs (learning management systems) or LCMSs (learning content management systems). These terms are often used interchangeably, and despite differences between these platforms, they have many features in common.

Learning platforms exist as proprietary or open-source software. Proprietary LMSs are licensed under exclusive legal rights, restricted from modification, further distribution, reverse engineering and other uses. They are distributed as closed-source programs with LMS licence costs based on a per user fee. Open-source programs, work under the terms of the GNU General Public License, which is intended to guarantee freedom to share and change the program, and ensure that it remains free for all users.

Solutions for low Internet connectivity can be considered, such as LAN (local area network)-based LMS, offline players and mobile-learning technologies.