THIS WEEK: Management Strategies

Moodle: A Low-Cost Solution for Successful e-Learning

By Margaret Martinez and Sheila Jagannathan

E-Learning professionals are constantly looking for new ideas and for successful online learning solutions, especially cost-effective ones. The open source software community claims to have a great, low-cost system for learning management or course management. It is called Moodle, and it may be well worth your consideration.

While there are several open source Learning Management Systems (LMSs) available today, we are focusing on Moodle because of its rapidly growing presence. We also chose Moodle because a global community of professionals and educators who are very passionate about promoting free software and improving the online learning experience supports it.

In this article, we look at the growing acceptance of Moodle and we answer a few key questions:

• What is Open Source Software?
• What is Moodle and why should I use it?
• What about Moodle and instructional design?

We'll also touch briefly on who is using Moodle, on Moodle upgrades, and on Moodle demos and other resources.

What is Open Source Software?

Any discussion about Moodle should begin with a brief introduction to open source software (OSS) and the OSS community.

OSS is a collective name for software code that is freely available and distributed. In contrast to proprietary or commercial software, anyone may copy, modify, and share open source code without paying royalties or fees. The soft-

Not too long ago, Moodle was a little-known content and learning management application supported by a tiny community. In the last two years, it has enjoyed tremendous growth, starting in the education community but now spreading to small- to medium-size businesses. Should you be looking for ways to put this Open Source Software to work? This week's authors give you plenty of help in answering that question!

ware often evolves through community development, contribution, and cooperation.

The Open Source Initiative (OSI) (http://www. opensource.org/), a non-profit corporation, requires that the distribution terms for open source software must, among other things:

- Permit free redistribution of source code
- Allow derived works
- Ensure integrity of the author's code
- Not discriminate against persons, groups, or fields of endeavor
- Share licenses

The growth of open source software and its benefits

Over the past few years, OSS has risen from obscurity, and has largely overcome early criticism and skepticism. It now enjoys enthusiastic support and adoption by organizations around the world. Along with these changes, attitudes are also rapidly shifting about the use of open source learning management systems.

Positive perceptions about using a low-cost LMS have resulted in the introduction of such systems into more and more institutions, organizations, and businesses. Open source learning management systems

have already significantly penetrated into higher education, and are making inroads in the corporate sector, especially for small businesses.

Advocates suggest that a desire to avoid higher costs, inflexibility of commercial or proprietary products, and increased dependence on LMS vendors have greatly influenced willingness to choose open source software. Many organizations find that open source software brings other benefits. For example, it is advantageous if an entire school district, university, federal agency, or small business can install a LMS without having to purchase multiple per-seat or site licenses.

Some objections to open source software

Critics suggest that OSS may be too risky to implement because products may not be proven. There is also fear that open source software may be too costly to administer, if it depends on a large pool of changing resources, if there are hidden costs, and if there is a need to manage evolving upgrades and patches.

We suggest that you need a strong application development group, or additional IT staffing, or third-party organization support to maintain an enterprise OSS solution. In other words, OSS can become just as inefficient as proprietary software if it is not a mature, well-

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tested product, and if it is not managed appropriately, efficiently, and cost effectively. Evidence from experience suggests that open source applications are, in fact, less costly to acquire, install, and customize compared to commercial or proprietary applications.

What is Moodle?

Moodle, which stands for Modular Object-Oriented Dynamic Learning Environment, is an enormously versatile system for course and learning management. According to The eLearning Guild Research *360° Report on Learning Management Systems*, published in May, 2008, many Guild members value it. (*Editor's Note:* This report is available for download as a PDF file by Guild Members, Members Plus, and Premium Members, and by Associate Members who participated in the survey upon which it is based.)

Moodle development started as doctoral research by an Australian, Martin Dougiamas. Today, Moodle has attracted a long list of developers devoted to Moodle improvements. Figure 1 shows the Moodle site at www.moodle.org, where you will find additional information about developers and users, as well as links for downloading the application itself.

Market share

Introduced in 1999, Moodle has enjoyed tremendous growth in the last couple of years (see Table 1).

Growth has been especially fast within the higher-education market. More recently, Moodle is finding increased adoption outside the education sector. Guild research shows that Moodle is making its greatest penetration in the small-to-medium business market. Figure 2 on page 4 shows the usage reported in the last 12 months by Guild members in the education market (668 higher education and K-12 institutions), and Figure 3 on page 4 shows the usage in the same period by Guild members in business organizations (1,932 organizations).

In the previous 12 months, Moodle's "grand total" in the education market was only 34.1%. Its growth in this sector came at the expense of Blackboard and "Developed in house." In the business market, the change was even more spectacular. For the previous 12 months, Moodle had a market share of 18.6%, in second place behind "Developed in house," which at that time accounted for 24.4% of the business organization installations. Moodle appears to have gained market share, not only against the homegrown LMSs, but also against SumTotal Systems and Saba.

(*Editor's Note:* Readers who have access to The eLearning Guild Research Real Time Direct Data Access to the 360° Reports can view this data online.)

But is Moodle ready to take on the enterprise-wide needs of a large corporation? It is important to keep

two things in mind as you look at the market share figures. Typically, in large organizations and corporations Moodle use is restricted to departmental, divisional, or experimental use. And among Guild members in the education sector, Moodle rarely impacts as many learners as a commercial product, such as Blackboard.

Whether you work in education, government, or the corporate sector, you cannot ignore Moodle's penetration into the LMS market. While Moodle isn't about to replace proprietary enterprise-wide products like Saba's Enterprise or SumTotal's TotalLMS, Guild members are using and liking Moodle a lot.

Why do organizations choose Moodle?

In the *360° Report*, members who tried or adopted Moodle report high satisfaction rates, low costs, and easy implementation and use. Ninety-five percent of the users indicated they did not intend to find an alternative solution.

In ten years, Moodle has already attracted a large and diverse user community. There are 345 sites with more than 10,000 users. Moodle's obvious appeal is that it has the potential of creating cost-effective online learning communities, in rich and poor countries alike.

In higher education, Moodle's reputation also stems from the academic community's values of freedom, peer review, and knowledge sharing. Supporters say that Moodle helps educators create an effective collaborative online-learning community using sound ped-

Table 1 *Growth in Moodle use worldwide*

	2006	2008
Registered sites	> 22,000	> 49,000
Users	> 9,000,000	> 26,000,000
Courses	~ 900,000	> 2,400,000

OSS is a collective name for software code that is freely available and distributed. In contrast to proprietary or commercial software, anyone may copy, modify, and share open source code without paying royalties or fees. The software often evolves through community development, contribution, and cooperation.

Figure 1 *The Moodle Web site*

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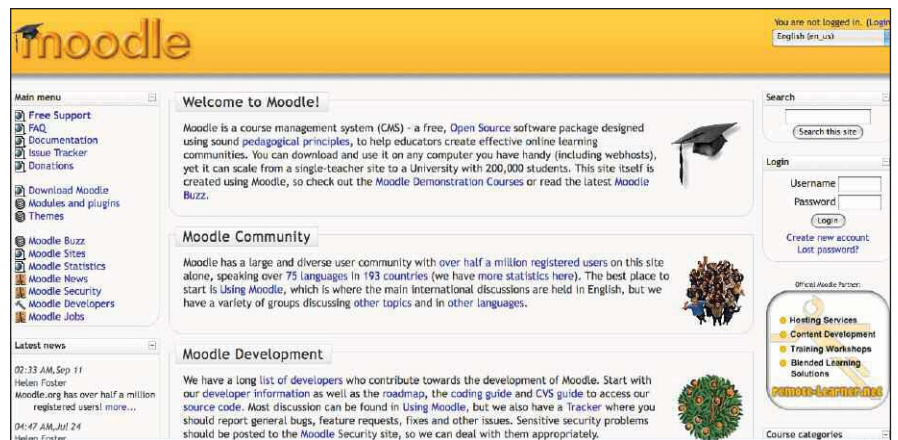
agogical principles for a very low cost. You can easily and quickly install it, it can scale up to accommodate a large user base, and it provides typical LMS features present in most similar commercial products. Moodle updates are common, the development community is very supportive, and its universal use is providing reliable learning solutions.

Most of these considerations apply as well to business organizations, especially small ones.

How are educational institutions using Moodle?

There are many educational institutions using Moodle, some on a very large scale. A good example of a large Moodle implementation site is the Open Polytechnic in New Zealand. This institution has deployed Moodle across eleven polytechnics and three universities, along with several Government departments and a growing number of schools. In 2007, in recognition for its work in open source software development and collaboration, the Open Polytechnic of New Zealand won a prestigious $100,000 award from the United States-based Andrew W. Mellon Foundation. The school's Moodle site is at http://campus.openpolytechnic.ac.nz/moodle/.

As another example, the Open University has announced a $7,390,000 OpenLearn initiative that offers 900 hours of e-Learning available on their new Moodle platform for over 180,000 students. Canada's Open University, Athabasca University, has switched to Moodle for developing an effective learning management system that serves over 30,000 users for eleven undergraduate and graduate courses.

What are Moodle's advantages?

Surveys, including those done by eLearning Guild Research, describe a variety of advantages for using Moodle. Advocates highlight important advantages, such as:
- Lower total cost for ownership
- Higher levels of security
- Peer review
- Greater flexibility
- Ability to customize by modifying code
- Audit ability and code availability
- Technical support
- Well-tested updates and plug-ins
- Variety of capabilities and tools

Many say that cost savings is not the key Moodle advantage, but it is rather access to various innovative tools that interface with the Moodle platforms. Others like the adherence to open standards, and the promotion of interoperability, roles and user management, use of innovative plug-ins, and the support from online communities of practice.

Others like the large user community that fosters

review, quality, reliability, accuracy, accountability, collaboration, and greater communication. Moodle users find that the breadth of talented people available is so great, that they can communicate with a developer or download a patch at any time of day, anywhere. Moodle is helping the education world set, follow, and maintain standards. Others suggest that Moodle developers are leading the way in e-Learning technology innovation because they can work as a community with common interests, and foster collaboration in the pursuit of knowledge sharing and rapid development.

Finally, Moodle is available in many languages, thereby greatly increasing the reach of the LMS to educators everywhere. Anyone (students and teachers alike), can choose to view a Moodle site in a different language simply by selecting the language from a drop-down menu on the upper-right corner of the screen.

Figure 2 *The top 10 LMSs in use by 668 education organizations, as reported by eLearning Guild members in the last year. (Source: Guild Research)*

	1 - 50 workers	51 - 500 workers	501 - 2000 workers	2,001 - 10,000 workers	More than 10,000 worke..	Grand Total
Blackboard, Inc.	37.9%	50.0%	68.2%	61.1%	51.1%	56.7%
Moodle	58.6%	50.0%	37.9%	42.6%	31.9%	45.3%
ANGEL Learning	6.9%	20.8%	8.3%	5.6%	14.9%	10.9%
Desire2Learn Inc.	6.9%	6.6%	5.3%	8.3%	8.5%	7.2%
Developed In-House	10.3%	1.9%	3.8%	5.6%	10.6%	5.6%
eCollege	5.2%	3.8%	0.8%	5.6%	8.5%	4.2%
Oracle	3.4%	3.8%	1.5%	0.9%	2.1%	2.3%
Resource Development Company	3.4%	0.9%	2.3%	0.9%	4.3%	2.1%
Articulate	5.2%			1.9%	4.3%	1.6%
Skillsoft, Thomson NETg	1.7%	0.9%	0.8%	2.8%	2.1%	1.6%

	1 - 50 workers	51 - 500 workers	501 - 2000 workers	2,001 - 10,000 workers	More than 10,000 worke..	Grand Total
Moodle	48.2%	24.6%	15.3%	12.7%	6.3%	22.1%
SumTotal Systems Inc.	7.3%	9.8%	12.3%	17.6%	24.8%	15.4%
Saba	11.3%	8.2%	10.4%	12.0%	21.4%	13.7%
Developed In-House	17.6%	13.1%	8.6%	8.1%	13.7%	13.1%
Blackboard, Inc.	16.6%	13.7%	9.8%	7.7%	7.4%	11.0%
Plateau Systems, LTD	5.3%	7.7%	9.2%	9.9%	13.7%	9.4%
Skillsoft, Thomson NETg	8.0%	7.1%	5.5%	10.2%	11.7%	9.2%
Oracle	6.0%	3.8%	6.7%	12.0%	8.8%	8.0%
Learn.com	4.7%	7.7%	11.7%	7.7%	3.1%	6.3%
GeoLearning	5.6%	7.1%	6.1%	4.2%	3.1%	5.1%

For example, if you selected Chinese, the interface of the site (menus, tabs, and other labels) will change into that language. Educators can easily enhance learning based on local preferences. Note however, that Moodle does not translate the content itself. Any user-generated content remains in the language in which it was entered.

What are Moodle's disadvantages?

In contrast, Moodle critics mention many of the OSS criticisms. For example, some feel that Moodle is not quite "enterprise-ready," nor able to support "mission critical" programs. Some suggest that Moodle is not truly free, and is only as good as the expert support available. Problems may occur with too much customization. Other common criticisms are that Moodle lacks:

Figure 3 *The top 10 LMSs in use by 1,932 business organizations, as reported by eLearning Guild members in the last year. (Source: Guild Research)*

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- The ability to integrate with human resource systems
- The ability to integrate well between student administration systems and Moodle student information
- The ability to support specific and complex business-process models
- The ability to use a distributed administration model to support multiple "schools" and "departments"
- The polished look of proprietary software, (it has a flat structure for organizing and navigating learning materials)
- Sophisticated assessment and grading capabilities
- Efficient use of space, e.g., a fixed block at the top that wastes valuable screen "real estate"

With respect to cost, 64.8% of Guild members who implemented Moodle report that the total cost to acquire, implement, and customize the LMS was under $10,000. The average total cost of ownership per learner for the 18 Moodle implementations that reported this data was $16.77, the lowest of the top 11 systems (not including the "built-our-own" responses. The median cost of the 18 was $5.83, the second lowest (lowest was IntraLearn, at $5.32).

Nowadays, W3C capabilities that provide new techniques to improve accessibility and use of dynamic Web content are helping to overcome many of the other criticisms. Moodle Partners, companies who provide a range of commercial services to support Moodle use, are helping their clients deal with these and other more common issues, such as hosting, remote support, customization, training, and integration with other systems (e.g., ERP Systems). A list of the Moodle partners is online at: http://moodle.com/.

How does Moodle enhance teaching and learning?

Moodle's learning innovations excite educators. At its core, Moodle is educational software grounded in a philosophy of collaborative learning, often referred to as social constructionist pedagogy. This approach views learning as a creative social process, as much as it is an individual one, where people learn together by investigating, analyzing, collaborating, sharing, and reflecting. Perhaps this is a key reason why it has had such a rapid uptake among the educational community. Moodle was built with elements and tools that embody pedagogical understanding, including these concepts:

- Effective learning takes place when learners are actively engaged in constructing knowledge (i.e., creating or doing), rather than passively reading, memorizing, or viewing.

- An inquiry- and discovery-based approach is an effective way to learn.
- Students learn better with supplemental materials.
- Observing and interacting with our peers and the community is also crucial for learning and retention.
- Collaborative environments encourage participants to be both teachers and learners at the same time.
- Learning environments need to be flexible, and adapt quickly to satisfy learner needs.
- Creativity and innovations are sparked (emotional appeal) when everyone has an opportunity to contribute, exercise his or her voice, and participate.

Sidebar 1 *Moodle Demos*

If you want to find out more about Moodle, you can take a Moodle Features Demo course that provides examples of activities and resources at the Moodle Demonstration site: http://demo.moodle.org

Other demos are available at:
- http://learn.newcurioshop.com/moodle/
- http://www.moodlerooms.com/learningcenter/moodledemos/
- http://remote-learner.net/demo/moodle
- http://www.kineolearning.com/demo/ (Requires registration)

Sidebar 2 *Moodle Publications*

These resources discuss ways to develop courses and to teach online. They have a social networking focus, and they incorporate interactive activities to encourage sharing and group communication. The authors accommodate multiple ways to learn, and facilitate development of a robust, active learning community.

In these books, look for ways to connect teaching with specific Moodle activities and resources for better teaching, more motivated students, and more successful courses. Also, look to see how you can add interactive activities and social features to encourage students, and help them reach their learning potential.

Moodle documentation by the Moodle Community. Found November 5, 2008 at http://docs.moodle.org/en/Main_Page

Moodle manuals and tutorials by the Moodle Community. Found November 5, 2008 at http://docs.moodle.org/en/Moodle_manuals

Cole, Jason. *Using Moodle*. (2005) Sebastopol, California: O'Reilly Media, Inc.

Chao, Ining Tracy. "Moving to Moodle: Reflections Two Years Later." *EDUCAUSE Quarterly*, Volume 31, Number 3. Found November 5, 2008 at http://connect.educause.edu/Library/EDUCAUSE+Quarterly/MovingtoMoodleReflections/47088?time=1225925166

Korte, Laurie. *Moodle Magic: Make It Happen*. (2007) Bloomington, Illinois: FTC Publishing.

Lawrence, Ray. *Moodle Course Creator Reference Manual 1.8*. (2008) Telford (UK): HowToMoodle. (http://www.lulu.com/content/1930255)

Rice, William. *Moodle 1.9 E-Learning Course Development*. (2008) Birmingham (UK): Packt Publishing.

Rice, William. *Moodle Teaching Techniques* (2007) Birmingham (UK): Packt Publishing.

The organization and design of Moodle's interface supports learners and learning tasks, not technology and tools. As an organizing framework, Moodle offers a choice of three different course formats that cater to a variety of e-Learning experiences. For example, you can organize your course materials using the traditional Topic format, a Weekly format, in which you organize content chronologically week-by-week, or even a Social format, which is less formal and more discussion-focused.

In terms of features, Moodle has all the standard features of a LMS that supports a content-driven learning model (i.e., tools for course structuring, presenting text and multimedia, interactivity, quizzes, and assessments). Figure 4 shows a partial list of the available collaborative activities. In addition, Moodle provides a suite of tools to promote interaction and social networking among people, so that they can share ideas, collaborate in small groups, discuss, and reflect upon experiences.

With Moodle, you can create richly textured courses, each with its own set of resources and activities, including audio and video. A Moodle course can consist of lessons, including reading materials, activities (such as quizzes and projects) and social events that encourage participation between students. For example, students can upload assignments, and teachers are alerted to mark assignments and send messages to students.

Moodle offers hundreds of optional modules. The Chat module helps groups of students in face-to-face learning with supplementary activities, both remedial and extension. Teams can use the Wiki module to co-author a document. The Choice module provides a poll to ask students simple questions. The Quiz module allows you to use a variety of item types to conduct simple assessments.

Discussions and dialogs are at the heart of effective online courses, and Moodle supports these through three standard channels of communication: Discussion forums (an asynchronous, public way of sharing thoughts), Chats (a more immediate and simultaneous conversation with groups), and Dialogues (a private channel between two or more people).

Using the optional modules, Moodle draws on Web 2.0 scenarios and promotes new channels of collaboration, such as:

- Journals, to encourage participants to reflect on the course and content, to experiment in a safe haven, and to stimulate deep thinking and learning
- Wikis, as a simple, flexible way to create artifacts (e.g., group lecture notes, papers, or contributions to other wikis) collaboratively
- Glossaries, that learners create collaboratively to

internalize the vocabulary of the field and negotiate their meanings
- RSS and other forms provide a hub for sharing, such as collaborative works created by learners via blogs, video blogs, and Podcasting of shows created by students

Another example of using Moodle to enhance learning is the ability to provide timely feedback and responsiveness. Analyzing student requirements and providing prompt feedback addresses an important criticism of e-Learning compared to traditional face-to-face classrooms. Moodle allows teachers and students to provide both quantitative (via grades) as well as qualitative (via customizable scales) feedback for nearly all activities and modules. For example, the Assignment module (in which learners can upload their work in any file format) allows the instructor to provide detailed comments in text as well as in audio formats. This is also true of Journal and many other modules, in which you can restrict feedback, or make it accessible to all participants.
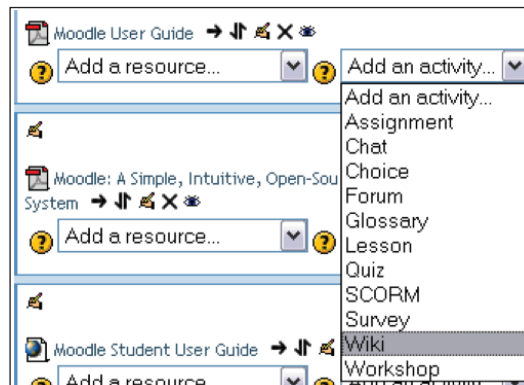
Whether you work in education, government, or the corporate sector, you cannot ignore Moodle's penetration into the LMS market. While Moodle isn't about to replace proprietary enterprise-wide products like Saba's Enterprise or SumTotal's TotalLMS, Guild members are using and liking Moodle a lot.

Figure 4 *Moodle activities include a variety of collaborative formats*

Sidebar 3 *OSS Resources for e-Learnong and use with Moodle*

Blender 3D Modeling Tool: http://www.blender.org/

Course Lab Authoring Tool: http://www.courselab.com/

Croquet 2D + 3D Modeling Tool (Multi-user virtual world construction): http://www.opencroquet.org/index.php/Main_Page

Drupal Content Management: http://drupal.org/

eXe XHTML Editor (IMS/SCORM authoring tool for Moodle): http://exelearning.org/

Gimp Image/Photo Editing: http://www.gimp.org/

Jahshaka Editing and Effects Tool: http://jahshaka.org/

Jing (Screen image and video capture tool): http://www.jingproject.com/

Kineo e-Learning Solutions: Clive Shepherd *60-Minute Masters* http://www.kineolearning.com/60minutemasters/

NVU Web Authoring Editor: http://net2.com/nvu/

TeacherTube Instructional Video Sharing (Host, tag, and share instructional videos): http://teachertube.com/

Help from the developer community

In addition to educational value, Moodle catalyzes a passionate and active developer community. The developers and educators are continuously innovating, and adding more sophisticated features to enhance the teaching and learning experience. While a core team of developers resides in Perth, Australia, contributing developers are located around the world.

Sidebars 1, 2, and 3 on previous pages provide links to important re-sources in the developer community and elsewhere.

Moodle going forward

After a five-month beta-testing period, and a year after the release of version 1.8, the core team of developers released Moodle version 1.9 in 2008.
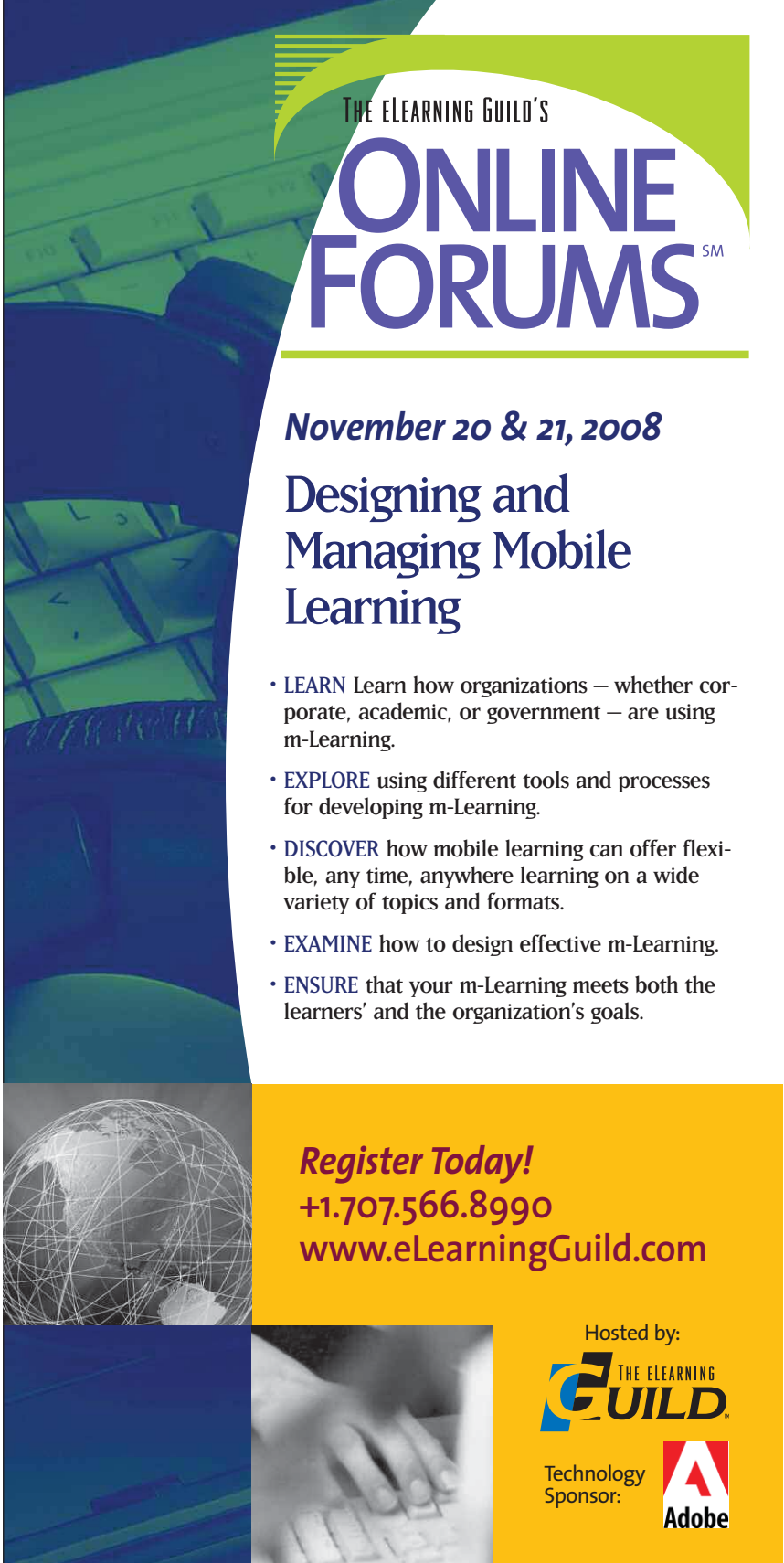
Major new features include:
- An all-new Gradebook, designed from the ground up for expansion and integration with other systems (sponsored by Open University).
- Integrated support for Outcomes, so that you can tie learning goals to individual courses and activities, and grade against them.
- A huge increase in performance due to review and refactoring of many parts of the Moodle code. Large sites especially will see major speed increases.
- Tagging is now a core function, allowing users to easily link things such as blogs, courses, etc., as well as to link external sites such as Flickr and Youtube through using simple tags.

Work is now ongoing for Moodle 2.0. Some changes expected very early in 2009 are:
- File handling improvements
- Conditional activities that allow dependencies, and forced paths through activities, e.g., "You can't do this thing until that thing is completed."
- Learner plans and competencies, so individuals can have learning plans that are updated when courses are completed
- Improved HTML editor 2.0
- Community hub interfaces, which make it easy for users to find and navigate other systems and external Moodle repositories, leveraging the Moodle Network in various ways
- A Feedback module, that is cleaned up and included as a core module
- An improved Wiki module (nwiki), that is cleaned up and included as a core module

You can follow Moodle's roadmap at: http://docs. moodle.org/en/Roadmap and Moodle news at: http:// moodle.org/mod/forum/view.php?id =82 to monitor upcoming changes.

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Summary

The bottom line: tools are abundant in Moodle, but what is equally important to teach effectively using Moodle is willingness on the part of the teacher/facilitator to own and use the constructionist pedagogical principles. This approach entails a shift towards focus on the learner, learning as a social process, and learner as facilitator. Also, this would include a shift from being a "teacher" to a "facilitator," as well as a shift from being just a "source of knowledge" to being an influencer and role model of classroom culture. Many consider Moodle as a way to enhance teaching more motivated students and more successful courses. More on this philosophy appears at: http://docs.moodle.org/en/Philosophy.

The Moodle crowd is a very passionate community of developers, educators, and administrators who want to see education change to a more creative, social networking, collaborative experience. They see using Moodle as a way to change e-Learning, as we know it today. It will be fun to sit back and watch the future. Will Moodle help change the way we learn? Will it help to make learning more personalized? Also, will the usage numbers double by this time next year, or is Moodle just another passing trend? What is clear is those who are using Moodle are choosing to embrace the social constructivist pedagogical principles for more creative, collaborative learning.

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Both authors wish to state that the views expressed in this article are their own, and not those of their organizations.

Discuss these articles in the "Talk Back to the Authors" Forum of Community Connections (http: // www.elearningguild. com/community_connections/forum/categories. cfm? catid= 17&entercat =y). You can address your comments to the author(s) of each week's article, or you can make a general comment to other readers.

Additional information on the topics covered in these articles is also listed in the Guild Resource Directory.

In the Archives

This is the fourth article that Margaret Martinez has written for Learning Solutions. These are available to members in the Learning Solutions Archive online. Members must log in to download them. This is also the first article we have published on the topic of Moodle. *(Not a Guild Member? Join today for immediate access to all 276 articles!)*

Previous Articles by Margaret Martinez

"Open Source: A New Way to Solve an Old Dilemma" (October 2, 2006)

"High Attrition Rates in e-Learning: Challenges, Predictors, and Solutions" (July 14, 2003)

"What is Personalized Learning?" (May 7, 2002)

Best of the Blogs

"LinkedIn Facebook Twitter: Different Connection Style": http://elearningtech.blogspot.com/2008/11/linkedin-facebook-twitter-different.html (November 3, 2008)

"Russell Beattie was right, the mobile Web is dead": http://www.25hoursaday.com/weblog/ 2008/10/31/RussellBeattieWasRightTheMobileWebIsDead.aspx (October 31, 2008)

"Jing screencasts bandwidth limit": http://elearningtech.blogspot.com/2008/10/jing-screencasts-bandwidth-limit.html (October 29, 2008)

"Google Earth on iPhone – Significant Learning Applications": http://elearndev.blogspot.com/ 2008/10/google-earth-on-iphone-significant.html (October 27, 2008)

"Private equity and e-Learning: What gets funded in turbulent economic times?": http://elearnqueen.blogspot.com/2008/10/private-equity-and-e-learning-what-gets.html (October 25, 2008)