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Learning Management Systems:
Practical Considerations for the Selection and Implementation of an E-learning Platform for the Navy

28 January 2007

by

Dr. Magdi N. Kamel, Associate Professor

Graduate School of Operational & Information Sciences

Naval Postgraduate School

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Abstract

A key element of the Navy's Manpower, Personnel, Training and Education (MPT&E) mission is to recruit, develop, manage and deploy a workforce in an agile, cost-effective manner. In order to accomplish its mission, MPT&E strives to provide the right sailor with the right skill sets in the right job at the right time, and to manage his/her career path in support of warfighting capabilities. To support this objective, some form of automated learning management system or virtual learning environment is needed. A learning management system (or LMS) is a software application that enables the delivery and management of online content to learners.

Keywords: Navy Manpower, Personnel, Training and Education (MPT&E), workforce, automated learning management system (LMS), virtual learning environment

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Executive Summary

A key element of the Navy's Manpower, Personnel, Training and Education (MPT&E) mission is to recruit, develop, manage and deploy a workforce in an agile, cost-effective manner. In order to accomplish its mission, MPT&E strives to provide the right sailor with the right skill sets in the right job at the right time, and to manage his/her career path in support of warfighting capabilities. To support this objective, some form of automated learning management system or virtual learning environment is needed. A learning management system (or LMS) is a software application that enables the delivery and management of online content to learners.

This research investigates the feasibility, suitability, and use of learning management systems to support online and blended learning in the Navy. The research addresses many issues related to the selection, implementation, and use of learning management systems, such as: the current state of the learning management systems industry, the essential functional and technical requirements of an effective learning management system, the process and pitfalls for selecting, implementing, and evaluating a learning management system, the case against using learning management systems, and future trends and directions of LMS applications.

A major benefit of using a learning management system is to facilitate "anytime, any place, any pace" access to learning content and administration. Typically, a LMS allows for learner registration, delivery of learning activities, learner assessment and tracking, and report generation on learner progress and assessment results. Advanced LMS features include competency management, skills-gap analysis, succession planning, certifications, and resource allocation. **As such, a LMS should be considered a high-level, mission-critical, strategic solution for planning, delivering, and managing all learning events within MPT&E—including online, virtual classroom, and instructor-led courses**.

Although LMSs are extremely useful in delivering and managing structured content, if learning is based on discovery, exploration, and thinking, the artificial and structured approach of content delivery and interaction of a LMS could be very limiting. In this situation, rather than a adopting a large, centralized, closed, mono-cultural LMS that dictates the nature of interaction between learners, instructors, and content, **we recommend that the Navy consider adopting an integrated learning environment (ILE) that consists of a set of diverse tools that provide students with connected specialization, modularization, and decentralization.** Such an environment would place the learner at the center of learning and would allow him/her to explore various areas and directions of personal interest. It would integrate blogs, wikis, social networking tools, collaborative spaces, knowledge management, "connecting-enabling" protocols like RSS, and other tools. The intent of the ILE is to give the learner the control needed to attain his or her own personal learning goals.

Regardless of which approach is adopted, **a crucial first step for the Navy is to have a clear understanding of the virtual learning environment and develop a clear learning strategy**. A learning strategy should include, among other elements, the nature of the learning to be carried out, the characteristics of the learners, how learning is to be delivered to them, what learning pedagogy is appropriate for them, the optimal level of social interaction for learning, and available resources. Organizational goals and objectives should also be defined clearly and the strategy aligned to them.

This research also supports the need to develop a learning architecture as a prerequisite to implementing a learning management system or an integrated learning environment. A learning architecture defines the basic functionality required from a learning management system or integrated learning environment, such as: learner registration, delivery of learning activities, learner assessment, tracking, and reporting. It should also include advanced functionality, such as: content authoring, competency management, skills-gap analysis, succession planning, certifications, and resource allocation. A learning architecture also defines links to external information sources and external communities.

It is easy, yet dangerous, to let technology determine how learning occurs. Therefore, before selecting a technology solution, it is crucial that Navy decision-makers clearly determine and prioritize requirements in order to find the most suitable learning system to meet the Navy's current mission requirements, as well as one which can grow to meet subsequent and changing future requirements.

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I. Introduction

Online and blended delivery of training and professional development is an important feature of the contemporary workplace. A wide range of corporate, public and educational organizations use Information and Communication Technologies (ICT) to support the education of their workforce. E-learning allows learners to access learning without the expense and disruption involved in attending courses at a particular geographic location.

To implement e-learning successfully, an organization requires some form of learning management system or virtual learning environment to support the learning process. Learning management systems (or LMSs) are software packages that enable the delivery and management of online content to learners. Most LMSs are web-based to facilitate "anytime, any place, any pace" access to learning content and administration (”Learning management systems,” 2007). Typically, a LMS allows for learner registration, delivery of learning activities, learner assessment and tracking in an online environment. A key component of a LMS is the ability for managers to generate reports on learner progress and assessment results. More comprehensive LMSs often include tools such as competency management, skills-gap analysis, succession planning, certifications, and resource allocation. As such, a LMS can be considered a high-level, strategic solution for planning, delivering, and managing all learning events within an organization—including online, virtual-classroom, and instructor-led courses.

There is a plethora of such systems available, ranging from commercial offerings such as Sumtotal, Saba, and Plateau Systems to open source solutions such as Moodle, First Class, and Interact. The question of which software to use for a given learning situation is complex. Factors to be considered include the nature of the learning to be carried out, the characteristics of the learner, the preferred pedagogy, IT support and cost.

1. Research Questions

The aim of the current research was to answer the following research questions.

1. What is the current state of the learning management systems industry?
2. What are the essential functional and technical requirements of learning management systems to make them effective learning tools in the workplace?
3. What is the process for selecting and implementing a learning management system?
4. What are the pitfalls for selecting and implementing a learning management system?
5. How can learning using a learning management system be evaluated?
6. What is the case against using a learning management system in an organization?
7. What does an ideal learning environment for effective organizational learning look like?
8. What are the trends for learning management systems for 2008 and beyond?

II. Research Methodology

The present research comprises a review of the literature comparing various online learning environments and a detailed study of the experiences of users and developers of these environments.

1. Data Sources

Numerous data sources were used for this research. Most of the literature reviewed was obtained from the Internet via Google and Google Scholar searches. The material published online was supplemented by a number of Master's theses and PhD dissertations related to the topic of research.

In addition, a number of informal interviews and discussions were carried out at academic and corporate conferences with a range of people who interact with LMSs, such as learners, instructors, administrators and vendors. Based on the research questions, different sets of guideline questions were generated for the different categories of users. While the guideline questions were used as a focus for interviews, actual interviews tended to be fairly wide-ranging around these questions.

2. Data Analysis

A comparative analysis was used to evaluate the data collected in order to answer the research questions. Interview recordings were transcribed and compared to the written interview notes. Common themes from different interviews were combined to gain perspective on each of the research questions. A similar approach was taken to analyzing written material obtained from Internet sources and published articles.

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III. The Learning Management Systems Industry

The birth and growth of the Internet in the early 1990s ushered a new era of learning delivery. It was during the Internet boom of the mid- to late-1990s that computer managed instruction (CMI) systems used to manage computer-based training (CBT) evolved into learning management systems (LMS). As such, the LMS is considered a relatively new type of software application.

Although the core functionality of a LMS is to register learners, provide content to learners, track courses in a catalog, record data from learners, and provide appropriate reports to management, “LMS” means different things to different people. The functionality and feature list of each LMS is often rich with descriptions that can be interpreted in numerous ways. To further complicate the landscape, every LMS offered by vendors boasts specialized features in an attempt to provide that vendor with a competitive edge.

There is a surprisingly large vendor base of LMSs. In 2000, there were well over 100 learning management systems (LMS) on the market (Hall, 2001). In the subsequent years, these figures have dropped slightly due to consolidation, mergers and acquisitions. In addition to LMSs, other learning systems offering overlap functionality include: Learning Content Management Systems (LCMS), Knowledge Management Systems (KMS), Performance Management Systems (PMS), Talent Management Systems and many combinations of the above. Over the past 3 years, numerous LMS vendors began to either add or merge with other systems to create a more integrated learning management system. The LMS market appears to be in a continuous state of flux.

It is important to note that many LMS vendors are, in reality, content providers who develop software to manage the content they provide rather than manage a full corporate education or training program.

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IV. Functional and Technical Requirements of a LMS

One of the biggest mistakes organizations make is to let technology drive the selection of a learning management system. Therefore, it is important for organizations to clearly define and prioritize requirements before looking for a LMS. Once requirements are identified, they can then be matched to product functionality. In the following sections, we discuss essential functional and technical requirements of a LMS:

1. LMS Functional Requirements

a. Learner Features

To best serve learners, a LMS must allow them to do the following quickly and easily (elementk, 2003; Learning Circuits, 2005):

- Enroll and keep track of their progress in various curricula, courses, and other learning events,
- Assess their skills by identifying their competency gaps, matching those gaps to a prescribed curriculum to fill those gaps, and developing a learning plan to close those gaps that were identified,
- Access content using different media (e.g., classroom, CD-ROM, online, etc.), different methods (e.g., instructor-led, self-paced, blended), and different languages,
- Complete assessments prior to starting courses so they can target learning time most effectively, and
- Access reference materials to supplement courses.

b. Administrator Features

A good LMS should deliver five critical managerial functions to administrators: learner management, content assignment, tracking and reporting, content development, and communication (elementk, 2003; Learning Circuits, 2005). The following is a closer look at each of these functions:

- **Learner Management**
  - Create and issue access to the system,
  - Manage user registrations and profiles,
  - Manage all class-related resources, including classrooms and instructors,
  - Organize administrators and/or students into groups for reporting and content-assignment purposes, and
  - Integrate appropriate support tools—including exercises, reference materials, labs, tests, and collaboration tools.
- **Content Assignment**
  - Organize courses and events in catalogs that are intuitive and searchable,
  - Target content to the correct individuals or groups,
  - Designate selected content as “required” learning; allow students to select other courses as they desire,
  - Create, edit, distribute, and deliver assessments,
  - Develop certification and personalized learning paths,
  - Include learners’ job roles and functions, and
  - Deliver online, instructor-led courses in synchronous or asynchronous modes—including course setup, syllabus display, and registration and tracking.
- **Tracking and Reporting**
  - Track and report on student progress and activity,
  - Track and report professional development progress against a predefined set of training goals,
  - Track and report on compliance training deployment, and
  - Verify whether knowledge has been retained after training.

- **Content Development**

  - Develop new proprietary courses,
  - Develop new courses through a third party,
  - Use templates to speed development, and
  - Integrate proprietary courses seamlessly into the learning environment.

- **Communication**

  - Enable communication between administrators and learners,
  - Search and identify learners and deliver targeted courses, news, references, and other information to continually engage them, and
  - Supplement courses by integrating specific learning references into the platform and by allowing learners access to external resources.

c. Enterprise Features

In addition to Learner and Administrator features, a good LMS platform should provide methods to closely monitor whether the right employees are taking the right courses—and whether they're getting the information they need from them (elementk, 2003). It should be able to identify employees who need a particular course and inform them how it fits into their overall career path, when it is available, how it is available, if there are prerequisites, and when and how they can fulfill those prerequisites.

Once a learner completes a course, the LMS can administer tests based on proficiency requirements, report test results, and recommend next steps. As such, LMSs are critical in assuring that enterprises meet compliance and certification requirements.

2. LMS Technical Requirements

In the following section, we examine critical technical requirements of a LMS and why they are critical to the function of any enterprise management system (elementk, 2003; Hall, 2003).

- High availability: The LMS must be able to handle the different needs of thousands of learners, instructors, administrators, and content builders simultaneously.
- Scalability: The system should be able to expand—or "scale"—to meet increasing demands (both in terms of the volume of instruction and the size of the learning body) without compromising performance.
- Extensibility: The system should be able to easily add new functions and features as they become available—for example, connectivity and integration with other enterprise systems.
- Usability: The access, delivery and presentation of material must be easy-to-use and highly intuitive.
- Configurability: The system should be able to configure the user interface, administrator's reports, and other parameters to meet requirements.
- Interoperability: The LMS should be able to support content from different sources and multiple vendors' hardware/software solutions.
- Support of Industry Standards: The LMS should be based on open industry standards for Web deployments (XML, SOAP or AQ) and support the major learning standards (AICC, SCORM, IMS and IEEE).
- Stability: The LMS infrastructure should be able to reliably and effectively manage a large enterprise implementation running around the clock.
- Security: The LMS should be able to selectively limit and control access to online content, resources and back-end functions, both internally and externally. Security measures usually include user IDs/passwords and encryption.

V. Process for Selecting and Implementing a LMS

The following seven-step process adapted from Alvarado (2004) and Learning Circuits (2005) should be considered as a general guideline for the selection process.

1. Understand the Learning Environment and Determine a Learning Strategy

The fundamental first steps in selecting a LMS solution are to understand the learning environment and to develop a clear learning strategy. In developing a strategy, the following should be considered: The nature of the learning to be carried out (e.g., simple assimilation of facts and information—such as safety or operating procedures—or deeper personal development such as occurs in management or leadership programs), the characteristics of the learners (e.g., age, gender, educational background, computer literacy and accessibility, geographical location), the number of learners, what learning pedagogy is appropriate for the learners (e.g., transmissive or learner-centered), the level of social interaction for learning, the level of IT support within the organization, budget constraints (time, resources, money), available software that appears appropriate, and installation and maintenance issues (e.g., hardware platforms, skills available, server space, available user support). Corporate goals and objectives should also be defined and the learning strategy aligned to them. Critical success factors should be indentified and given a highest priority. Potential realized benefits and return on investment should also be taken into consideration.

Development of a learning strategy is a very crucial and non-trivial task. Indeed, it can be a separate initiative in itself. A learning strategy should reflect how learning programs are delivered to the people who need them to accomplish business goals.

2. Identify and Document Requirements

Specific requirements should be defined in each of the areas mentioned previously. One of the key factors in finding the right LMS for an organization is matching a LMS to requirements, not the other way around.

It is also important to prioritize requirements in a range from “must have” to “nice to have.” “Must have” requirements, or core requirements, are those which the LMS must meet within the initial implementation of the system. Any LMS that does not meet a “must have” requirement should be dismissed from further consideration. “Important to have” requirements are essential in the initial or subsequent phases of implementation. This means that the LMS may not be able to meet an “important to have” requirement for the initial phase, but a new, scheduled release appears to meet the requirement or there is a commitment from the LMS vendor to meet the requirement in the near future. Finally, “nice to have” requirements can be delayed indefinitely, but could be promoted to “important to have” requirements, so specifying “nice to have” requirements still have a bearing on how willing or open a LMS vendor is to considering them.

Another consideration is how the gaps between the requirements and the capabilities of a particular LMS can be filled. Usually, this is accomplished through configuration or customization of the LMS. Configuration refers to changeable parameters within the limitations of the code base of the LMS, while customization refers to the ability to add additional functionality (such as integration with other systems) not originally included in the LMS design. Customization, however, works against the flexibility, scalability, and efficiency of the system. Since customization is hard-coded, it usually requires extensive programming every time a new version of the LMS is used or when business conditions change.

Another important consideration is the hosted versus in-house installed solution. Hosted systems are maintained by the LMS provider, which acts as an application service provider (ASP). The LMS provider typically grants access to

users of the LMS and provides support for the system should problems arise. Modifications or customizations beyond what the application supports in configuration screens may need to be done by the ASP and can be restrictive. Installed solutions, on the other hand, are systems that are installed on the company's servers and network. The support of the hardware and applications would most likely fall on the IT organization, but there would be greater control over configuration and customizations of the LMS than in a hosted solution. Compatibility to standards such as SCORM (Shareable Content Object Reference Model) and AICC (Aviation Industry CBT Committee) should also be considered.

3. Research LMS Companies

Following the identification and documentation of requirements, it will be necessary to research potential LMS vendors. Information on each vendor is usually available on its respective Web site. Additionally, research and comparison reports may also be available from industry research firms such as Gartner, IDC, and the META Group. It is also useful to talk to customers in the same industry about their experiences with the vendors of their existing LMSs.

When researching LMS companies, decision-makers should focus on key areas surrounding the core or "must have" requirements. LMS companies will usually work with a client to fulfill "must have" requirements through partnerships, customization or future releases. From these reports, a short list of companies to which requests for proposals can be sent should emerge.

4. Prepare the Request for Proposal (RFP)

Based on the learning strategy and requirements identified in Steps 1 and 2 above, a Request for Proposal (RFP) should be prepared and sent to the selected potential vendors. A RFP is a written document that outlines specific requirements suppliers must meet in order to win the buyer's business. In the RFP, it is not necessary for organizations to indicate priorities of requirements, nor list them in any specific order; thus, each requirement is responded to equally. Each requirement

should be as specific as possible so that the LMS vendor can respond directly to the requirement rather than provide a general response.

Use cases or scenarios should also be included in the RFP. Use cases describe very specific situations important to the organization that the LMS needs to accommodate. These will give the LMS vendor a clear indication as to how it can meet specific situations.

The RFP should also include a request for a proposed project plan for implementation based on the requirements. The project plan must include timelines of the different project tasks. This will provide an estimate as to how long the vendor perceives implementation will take, the ownership for each task, and the details of the tasks themselves. Usually, experienced LMS vendors would already have a template of a project plan that could easily be applied in a proposal.

Finally, it is important to request a short response time for the RFP. This will give an indication as to how hard a company will work for the business and can be a strong, but not the only, indicator as to how it will perform in a business relationship.

5. Review the Proposals

A representative review committee should review the proposals and establish an agreed-upon rating system. Each proposal should be rated according to the rating system. Decision-makers should also include subjective comments for both positive and negative impressions in the rating documentation. This allows subjective impressions, in addition to the quantitative measures of each criterion, to be incorporated into the process.

The goal of the proposal review is to eliminate rather than to select. Hence, the focus of the proposal review should be on the core, or “must have,” requirements. These are usually the requirements that must be present in order for a buyer to consider the system. If even one of the core requirements cannot be immediately met by the LMS, that LMS should be eliminated from the list. For this

reason, only core requirements that truly represent imperative functionality should be incorporated. All other requirements must be considered, but the focus should be on the core requirements.

The result of the review should result in a short list of vendors. Usually, the shorter the list, the easier the final selection process will be.

6. Schedule Meetings and Demos

After the proposal review is complete, meetings and demos should be scheduled so that the vendors can answer specific questions and demonstrate their claims on the proposal. The review committee should be representative of all stakeholders. A scenario should be scripted, and vendors should be required to demonstrate their systems' capabilities in that specific user case. This is crucial if an organization is to determine how flexible or compatible its environment is with certain systems. Demos should be scheduled for 2–3 hours each and should be completed in a compressed time frame of 2–3 days to facilitate comparisons. It is also important that vendors make clear what part of the functionality is included out-of-the-box with minor configuration changes and what part requires customization beyond the quoted price.

If any of the review team needs to attend such a meeting virtually, it would be good opportunity to utilize a vendor's distance-learning solution. This will provide the capability to experience part of the environment as the learning audience would.

The review committee must question any part of the functionality or implementation that is not clearly understood. It is important that the account representative is able to explain functionality clearly and without ambiguity. Additionally, the flexibility of the project plan should be explored. An organization should not be required to adhere to processes that conflict with internal processes.

7. Make the Selection

Finally, a selection can be made after an organization carefully reviews and discusses the impressions made by each vendor during each meeting. Selection of a LMS is a serious and long-term investment, so it is important to have complete cooperation among the members of the review committee. It is also important to create contingency plans in case certain features that are expected in the initial implementation are not finished in time, or other unexpected delays or problems arise.

The steps outlined above represent a high-level approach to selecting a LMS to meet an organization's learning requirements. The approach is flexible, and the process cycle can be shortened, although usually at the cost of quality. It is important to note that a LMS solution can be a huge investment, and if the selection and implementation is not done thoroughly, can lead to enormous costs later in additional efforts to meet requirements.

VI. Pitfalls for Selecting and Implementing a LMS

There are many things that can go wrong when an organization is selecting and implementing a LMS (Egan, 2002; Hultin, 2005). The following are some of the common issues that organizations face when selecting and implementing a LMS solution:

- Failure to consider the LMS as a mission-critical system. As a result, its implementation gets little or no IT support.
- Failure to align business objectives with the capabilities of the LMS,
- Failure to understand how a LMS interacts with other systems and business units,
- Absence of an organizational learning strategy to drive the selection of the LMS,
- Failure to identify and engage all key stakeholders,
- Failure to obtain upper management buy-in and support,
- Setting up unrealistic expectations,
- No or ill-defined user requirements, and
- Lack of internal skills to support and configure the LMS.

The above issues are typical of software implementations in general and LMS implementations in particular. They represent some (but not all) problems that can be encountered during the course of selecting and implementing a LMS. Discussing these issues will hopefully raise awareness and prepare users and vendors to plan ahead and avoid pitfalls.

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VII. Evaluating Learning via Learning Technologies

Delivering training via learning technologies (i.e., LMSs) does not guarantee an organization a return on investment or that the learner's performance improved. One of the important issues facing LMS implementation is proving whether a learner actually gained knowledge and was able to transfer the knowledge to the workplace and, ultimately, to improve performance. The evaluation of training is a tricky subject, and numerous proposals by researchers and practitioners were advanced to measure it from "smile sheets" to "return on investment" (ROI) with mixed results (Theis, 2005). A widely used model for evaluating training was proposed by Donald Kirkpatrick (1998). Kirkpatrick's model consists of four levels of training evaluation. It is used for evaluating training effectiveness, whether that training was conducted via instructor-led classroom experiences or via e-learning experiences. A summary of Kirkpatrick's four levels of evaluation follows:

Level 1: Did they like the training?

Level 2: Did they learn something from the training?

Level 3: Did the training help them do their job better and increase performance?

Level 4: Did the company or department increase profits and customer service as a result of the training?

Phillips and Stone (2002) adopted Kirkpatrick's four levels evaluation and adapted it by adding a fifth level and applying six different measurements for calculating the effectiveness of an intervention. Table 1 summarizes their model.

Level and Data Type	Focus of Data	Data Usefulness
Level 1: Reaction and Satisfaction	Training program, facilitator, planned action.	Documents reaction to training by learners.
Level 2: Learning	Participant and support mechanisms to assist learning.	Measures knowledge, skill and attitudes learned from the training.
Level 3: Job Application	Participant, work-setting, and support mechanisms for applying learning.	Measures behavioral change on the job.
Level 4: Business Impact	Impact of the training process on specific organizational outcomes.	Determines the training impact in improving organizational performance.
Level 5: ROI	Monetary benefits as a result of training.	Evaluates the monetary value of the business impact of the training as compared to the cost of the training.
Intangible Benefits	The added value of the training in non-monetary terms.	Describes the intangible data (subjective) that emerge in evaluation of business impact.

Table 1. Five-level Model for Evaluating Learning
(adapted from Phillips & Stone, 2002)

As with most theories and models, there are differences in opinions as to how accurate evaluation can be. Kirkpatrick's model and Phillips and Stone's model above focus on specific training experiences. Additional researchers focus on performance management that is linked to corporate strategies and goals (see, for example, Kaplan & Norton, 1992).

VIII. The Case against Learning Management Systems

It has been suggested that LMSs in general are the wrong starting point for learning (Siemens, 2004; Siemens, 2006):

> Learning Management Systems are often viewed as a central point of any elearning or blended learning program. Although this perspective is desirable from a management and control standpoint, it is contrary to the way in which most people learn today.
>
> Learning management systems […] offer their greatest value to the organization by providing a means to sequence content and create a manageable structure for instructors/administration staff. The "management" aspect of LMS' creates another problem: much like we used to measure "bums in seats" for program success, we now see statistics of "students enrolled in our LMS" and "number of page views by students" as an indication of success/progress. The underlying assumption is that if we just expose students to the content, learning will happen (2004, p. 1).

Although certain learning tasks are well suited for a LMS, learning itself is different—it is not a process to be managed. Learning is by nature multi-faceted and chaotic (Conner, 2007). The LMSs of today define the manner in which learners learn. Their structured approach dictates the nature of interaction (instructors-learner, learner-learner, learner-content). Organizations that now lock into learning management systems will be able to successfully deliver and manage courses; they won't, however, be conducting effective learning. The idea of acquiring a large, centralized, mono-cultural software tool that can do it all is flawed (Parkin, 2004). The more feature-rich an individual tool becomes, the more it loses its usefulness to the average user. What is needed is a diversity of tools and choices, such as: blogs, wikis, content management systems, social networking tools, collaborative spaces, and the use of emerging "connection-enabling" protocols like RSS—that provide connected specialization, modularization, and decentralization and that place the learner at the center of learning and allow him/her to explore various areas and directions of personal interest.

As Siemens (2004) states:

Unfortunately, beginning learning with a LMS is often a matter of wrong tool for wrong purposes (which results in failed elearning implementations, ineffective learning, and unnecessary expenses). Implementing a LMS as part of a *holistic learning environment* gives the end user flexibility and control to move in various paths (driven by learning needs, not by LMS design). (p. 1)

IX. What Does an Ideal Learning Environment Look Like?

As discussed in the previous section, an ideal learning environment must ensure that an organization is providing effective learning, not just delivering content. Specifically, a learning environment should be able to (Masie, 2006):

1. Personalize invitations to learn and target them for each learner based on current and future requirements, performance goals, and critical events.

2. Support different stages of learning: initial learning, continued learning, remedial learning, upgrade learning, and transferred learning to new technology.

3. Support different types of learning: behavioral, cognitive, and sociocultural.

4. Create an executive “dashboard” for each manager that highlights, in real time, how his/her subordinates and teams are learning.

5. As rules and regulations change, inform employees and offer updated learning modules.

6. Integrate the organization’s social networking and facilitate informal learning.

7. Understand the learning styles of different learners and offer learning options appropriate for each employee, content domain and situation.

8. Incorporate new and emerging content models such as podcasting, wikis, blogs, social networking tools, and collaborative spaces.

9. Become part of day-to-day online automated tools, such as browsers.

10. Become integrated with the organization’s core mission and objectives and adapt accordingly to any changes.

11. Work with a wider range of devices, such as PDAs and mobile devices.

12. Provide measured, just-in-time learning.

13. Access an increasing number of reusable content both inside and outside the organization.

14. Integrate with other systems that share common objectives, such as Knowledge Management and Document Management Systems.

15. Keep track of and share employees' assessment of learning modules.

16. Become part of the organization's crisis management plan by delivering extremely rapid content.

Although many of these features are supported in varying degrees across the current offerings of LMSs, no tool currently exists that comes close to implementing the feature list of an ideal LMS. This situation creates a challenge for organizations trying to identify an approach for managing learning. Two options exist for organizations implementing a learning program: 1) either work with LMS vendors to restructure their systems to incorporate many of the features missing from their respective systems, or 2) abandon the adoption of a single LMS altogether and develop an alternative approach based on a toolbox of decentralized, modularized, learner-centric, piece-it-together tools, as described in the previous section.

X. Learning Management Systems Trends

A survey of the CEOs of the top learning management systems vendors indicates the following trends in the next few years (Masie, 2007a; 2007b; 2007c; 2007d; 2007e; 2007f):

1. Learning management systems continue to become a robust, stable, and tested platform.

2. Multiple learning management systems in organizations are being consolidated into one enterprise system.

3. Learning management systems are moving away from a focus on compliance training to strategic, mission-critical, innovative applications—such as just-in-time learning.

4. As a result, LMS projects are being viewed and deployed as mission-critical systems, and are thus getting higher visibility and support from upper-level management.

5. Increasingly, learning management systems are being integrated with enterprise systems such as Human Resources (HR), Content Management Systems (CM), Enterprise Resource Management (ERP), Financial, and other enterprise systems.

6. LMSs are becoming particularly HR-centric and are moving towards driving talent and performance management.

7. Learning management systems are increasingly being accessed, together with other enterprise systems, through customized and personalized corporate portals.

8. More emphasis is being given to the user experience and “ease of use” of a LMS.

9. Stronger emphasis is given to informal learning by incorporating wikis, blogs, PDFs, and knowledge and social network elements that connect people through interests, competencies, skills, and expertise.

10. The increased use of consolidated searches is exposing the end user to learning in a more blended fashion. These capabilities allow users to access both formal and informal content using a unified metaphor.

11. Increasingly, LMS vendors and customers are adopting standards such as SCORM and LETSI for content and integration.

12. Recently, vendors have moved towards Web Services and Multi-tenant Architectures—in which a LMS is used as a service rather than being acquired and run in house. This approach will lead to greater integration between e-learning and other enterprise systems.

The field of learning systems is continuously evolving. It is prudent for organizations to anticipate, influence and understand future trends of the industry and to match their current and future requirements with these trends.

XI. Conclusions

This research addressed the suitability and use of learning management systems as high-level, strategic solution for planning, delivering, and managing learning within large organizations, such as the Navy. The research addressed many issues related to the selection, implementation, and use of learning management systems—such as the current state of the learning management systems industry, the essential functional and technical requirements of an effective learning management system, the process and pitfalls for selecting, implementing, and evaluating a learning management system, the case against using a learning management systems, and future trends and directions.

Although a learning management system is extremely useful in delivering and managing a wide variety of structured content, the notion of "managing learning" conflicts with how people are actually learning today. In many situations, learners require a learning environment that allows for a very quick learning-structure creation and breakdown and that is continuously available. A learning management system has a long creation/breakdown process, and once the learning structure has been broken down (i.e., end of course), it is no longer accessible to learners. In such situations, rather than adopting a large, centralized, closed, mono-cultural LMS that dictates the nature of interaction between learners, instructors, and content, we recommend the Navy adopt an integrated learning environment (ILE) that consists of a set of diverse tools that provide rapid creation and breakdown through connected specialization, modularization, and decentralization. Such a structure places the learner at the center of learning and allows him/her to explore various areas and directions of personal interest.

Regardless which approach is adopted, organizations must first have a clear understanding of the learning environment, develop a clear learning strategy and architecture, and prioritize requirements before looking for a learning system.

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