

Leah Lang, Manager, Core Data Service

Judith A. Pirani, Consultant, EDUCAUSE, and President, Sheep Pond Associates

Overview

This special ECAR research bulletin series highlights findings from the EDUCAUSE Core Data Service, focusing on a small but meaningful slice of data collected in the CDS. These selected highlights are intended to provide context and meaning for CDS benchmarks that may be of especially broad interest, be especially timely, or draw connections between research from ECAR and CDS. The series is featured along with other CDS publications on the CDS website at <http://www.educause.edu/coredata> and is now available to eligible ECAR subscribers as part of their subscription.

This Spotlight focuses on data from the 2013 CDS to better understand how higher education institutions approach learning management systems (LMSs). Information provided for this Spotlight was derived from Module 8 of CDS, which contains several questions regarding information systems and applications. Responses from 525 institutions were analyzed. Only U.S. institutions with a designated Carnegie Classification (AA, BA, MA, or DR) were analyzed for this report. In addition, we interviewed four subject-matter experts to gain insights about the current and future state of LMSs in higher education.

Learning Management Systems: Now and Beyond

A learning management system is the integral, behind-the-scenes player in a student's learning experience, serving as the course hub for management and administration, communication and discussion, creation and storage of materials, and assessment of subject mastery. An LMS can host thousands of courses/sections and store millions of pages of content, and its expanding array of features and capabilities is increasingly intertwined with student and faculty activities.

Students recognize the LMS's importance in their academic experience. The report *ECAR Study of Undergraduate Students and Information Technology, 2013* reported that nearly all students used an LMS in 2013 and that the LMS appeared near the top of student ratings for very/extremely important to their academic success.¹ It is one of their three preferred communication methods with instructors (face-to-face interactions and e-mail are the other two).² Yet students consider LMSs to be underutilized. They wish their instructors posted more types of content on the LMS (e.g., problem sets, sample questions, instructor materials) as well as timely, in-progress grade information.³ In addition, students want to communicate more with instructors via the LMS,⁴ and they expect their instructors—not others—to train them to effectively use the technology required for coursework, including the LMS.⁵

CDS Spotlight Definitions

application programming interface (API): A language and message format used by an application program to communicate with the operating system or some other control program such as a database management system (DBMS) or communications protocol.

course management system (CMS): See *learning management system*.

integrated planning and advising systems (IPAS): Information systems that help identify, track, and interact with students who exhibit early signs of risk for attrition (e.g., absenteeism or poor academic performance), as determined through input from instructors or advisors, or automated monitoring of data in institutional systems such as the student information system or the LMS. Also known as early-alert or warning systems.

learning management system (LMS): Software that provides an integrated suite of online resources and communications capabilities in support of traditional courses and can also serve as a platform for fully online courses. A typical LMS provides a range of activity modules, such as forums, databases, and wikis; facilitates student assignments and quizzes; and enables monitoring of student engagement and reporting of grades. Many LMS implementations are integrated with student information systems.

learning tools interoperability (LTI): An open specification from the IMS Global Learning Consortium designed to enable plug-and-play integration of educational applications with the institutional enterprise. The most common use of LTI is to integrate learning tools into the campus LMS.

student information system (SIS): Software to manage information about students, including the admissions process, course registration and grades, degree audit, housing, etc., and provide student self-service functions (such as course registration) and access to course catalogues, class schedules, grades, transcripts, and so forth.

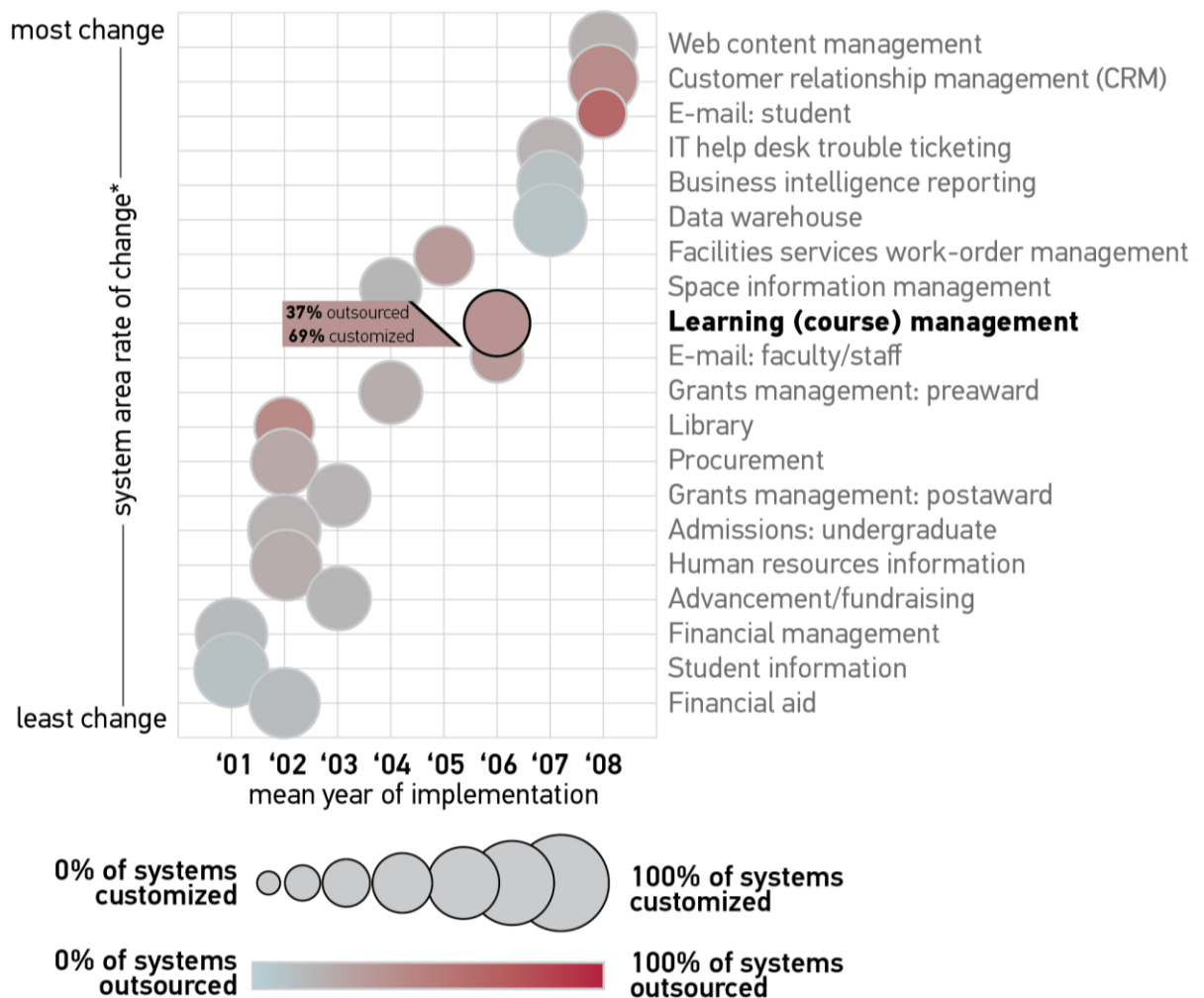
Sources: Core Data Service, EDUCAUSE, PCMag.com Encyclopedia.

Although students want more LMS use, research for the forthcoming ECAR faculty technology study found that a majority of faculty use the LMS and that they do so for basic activities like distributing course content to students. A majority of faculty also recognize the LMS as a tool to enhance teaching and learning, and though satisfied with their general LMS experience, many faculty express interest in being better skilled at integrating the LMS into their courses.⁶ EDUCAUSE members recognize the importance of addressing the disconnect between student expectations and faculty expertise, ranking the issue of Assisting Faculty with the Instructional Integration of Information Technology third in the EDUCAUSE list of 2014 top-ten IT issues.⁷

Long considered a utility system by many, the LMS continues to gain more attention as educators and administrators begin to recognize the strategic roles that its capabilities and data can play in the evolution of learning environments and in institutional planning.

Current Snapshot

Present at 99% of U.S. institutions, LMSs are ubiquitous. On average, however, these systems are eight years old, and 15% of U.S. institutions have planned replacements in the next three years. This moderate amount of churn in the market space puts LMSs ninth among other system areas in terms of rate of change (see figure 1).



*Rate of change is an indicator of how rapidly a system area is changing. It is a composite score based on year of current implementation and on plans to implement new systems or replace existing ones. Systems with the highest rate of change typically have been implemented recently or are expected to be implemented or replaced soon.

Figure 1. Characteristics of Core Information Systems

LMSs are the fourth most outsourced system area (37% outsourced), trailing behind student e-mail (65% outsourced), library systems (42% outsourced), and customer relationship management (CRM) systems (41% outsourced). The most popular outsourcing strategy is to have a vendor-hosted LMS (29% of all U.S. institutions, 77% of U.S. institutions that outsource their LMS). This environment is most common at community colleges, 41% of which use a vendor-hosted LMS, while another 10% outsource their LMS via some other management strategy (e.g., cloud or vendor managed).

Whether an outsourced or in-house management strategy is used, institutions typically place primary responsibility for the LMS in the hands of central IT (74% of U.S. institutions; see figure 2). For systems such as the LMS that are so widely and exhaustively used by students, it is considered good practice to have one standard technology for students to learn rather than several distributed systems.⁸ Community colleges are least likely to provide an LMS via central IT (32%). Instead, many community colleges facilitate student use of the LMS throughout their systems or districts by managing the LMS at the system or district office (35%).

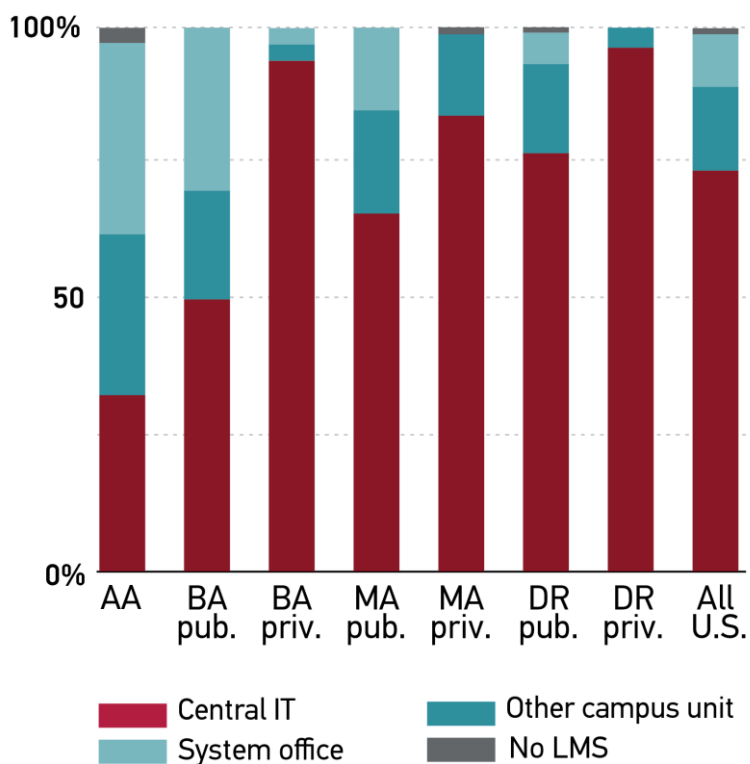


Figure 2. Primary Unit Responsible for LMS

Finally, unlike the diverse market space for data warehouse systems, in which only 50% of the market uses one of the top-five vendors, the LMS space is relatively homogeneous. Nine in ten institutions (93%) use one of the top-five LMS vendors, among which are several open-source options. Institutions vary greatly in their implementation of open-source LMS solutions. At community colleges, only 1% of LMS solutions are open source, whereas 70% of LMS solutions are open source at private bachelor's institutions. Figure 3 depicts the market share for the most common LMSs at CDS participating institutions.

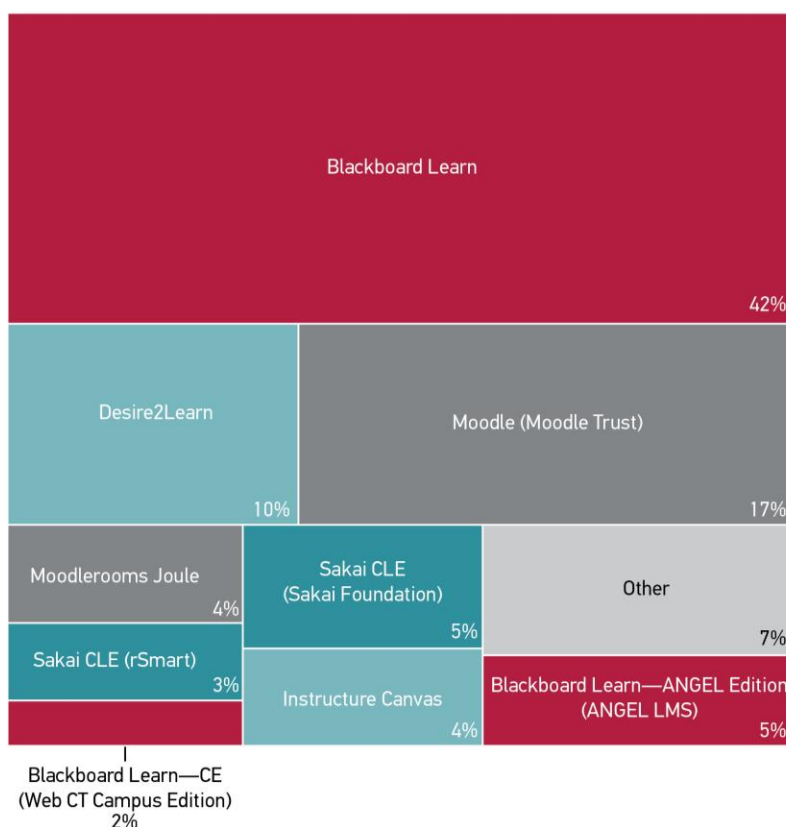


Figure 3. Learning Management System Market Share

Future Trends

For many years, the LMS has been an enduring, somewhat underappreciated, learning environment component, but its institutional profile has risen over time. Today, it's an important face for the institution as it evolves into a primary access point for students' course material and interactions. The LMS is poised to play a more visible role in institutional affairs as administrative and academic leaders increasingly factor its integral educational role and real-time student data into emerging educational models, student success initiatives, and institutional objectives. Additionally, as expectations increase for a seamless and rich learning experience that is both platform and device agnostic, the future LMS must be agile, integrated, and interoperable.⁹ How the LMS eventually morphs in support of this broader higher education role remains unclear, but this section touches on several evolutionary influences.

System Customization/Personalization

Traditionally, instructors and students adapted to structured LMS environments, using preconfigured toolsets. Over time, developments like the Learning Tool Interoperability (LTI) specification make it easier to customize an LMS by creating a standardized way to integrate additional tools. The longer-term trend points to customization at the individual level, where faculty and students augment core LMS feature sets with homegrown and third-party tools based on such factors as subject matter, pedagogy, faculty teaching and student learning styles, and other individual needs.

Data and Analytics

Data and analytics continue to capture higher education's attention, as evidenced by their presence in the EDUCAUSE 2014 Top-Ten IT Issues and Top-Ten Strategic Technologies lists, each of which includes two analytics-related issues.¹⁰ The LMS can contribute to analytics initiatives in a couple of ways.

At the course level, the LMS provides real-time data on student course activity, progress, and achievement, and these data can feed into academic advising and early-alerts systems, promoting student success. The theme of personalization comes into play again insofar as analytics tools allow faculty to identify at-risk individuals among their myriad of students and offer personalized interventions and support, based on data drawn from the LMS and student information system (SIS). In addition, commonly experienced problems with course materials or design (e.g., poor test scores or students spending excessive time on an online course section) may signal an immediate need for course remediation. However, LMSs will need powerful and intuitive data visualization tools so faculty can effectively analyze the profusion of the LMS data related to student behavior, performance, and other factors in order to determine appropriate action.

Institutionally, LMS data sets feed into broader analytics initiatives that can involve student information and other administrative systems. For example, LMS real-time student activity data complements the SIS's historic, big-picture trend data, providing a comprehensive view of student activity and performance that can contribute to institutional efforts to improve student retention, persistence, course completion, and learning outcomes.

System Integration

LMS integration with other systems continues to gain importance, both for routine and strategic endeavors. LMS integration with the SIS enhances daily operations—for example, to create daily class rosters, split courses into multiple sections, or record students' grades. Portal integration enables students to see their course grades and schedules without logging directly into the LMS. And as noted above, system integration can produce strategic benefits, too, when institutions tap LMS data for analytics and long-term planning.

Mobility

Mobile technology continues to impact LMS evolution, too. The anytime, anywhere expectations of both faculty and students heighten the need for LMS mobile capabilities. Students desire 24/7 course material and features access through their mobile devices; faculty members want to be able to monitor student activity while on campus or traveling so they can address arising issues in a timely manner. Mobile features like responsive web page designs and mobile apps continue to gain importance in LMS design; already some LMSs provide on-the-go information to course participants by pushing out activity updates in a variety of formats (e.g., e-mail, social media) without having to log in to the course site.

Supporting Other Emerging Trends

Higher education continues to explore and embrace new learning platforms and elements; institutions and vendors must consider the LMS's role in these trends. Consider, for example:

- Supporting MOOCs' large enrollments and pedagogical elements
- Incorporating course gamification's interactive game-like features and student performance ranking boards
- Using student data to determine fulfillment of badge requirements.

LMS features can be used in nonacademic ways, too, such as a polling mechanism in student government elections. Finally, as LMS use becomes more creative and complex, institutions and vendors need to place a priority on compliance with the Americans with Disabilities Act (ADA), especially in online environments, to ensure that all students can access course materials, utilize capabilities, and communicate with instructors and classmates.

Tips for Successful Implementations

Customization, data and analytics, and mobility signal forthcoming changes to LMSs' capabilities and institutional role. Our research yielded several recommendations to prepare institutions accordingly.

Customize to Enhance System Benefits

CDS data suggest that most institutions only minimally customize their LMSs today, but developments like the LTI specification could provide colleges and universities with easier and less expensive ways to customize LMS features to align with institutional goals and contexts. For example, customization enables institutions to fine-tune learning environments according to specific learning situations and goals. In addition, customization enhances academic agility; institutions can swap tools in and out of the LMS as new best-of-breed tools emerge or as market conditions impact the current tool's long-term viability.

Manage Data Issues Preemptively

The LMS contains a trove of student information, and upfront data management can maximize opportunities and forestall problems. For example, analytics offers numerous ways to use LMS student data, and leveraging the information effectively depends on a strategic plan developed at the institutional level and endorsed by the governance structure. A data and application architecture for learning and academic analytics tools is one means for institutional leadership to better understand the LMS data's strategic possibilities.¹¹

In addition, the student-related nature of LMS data means that security and regulatory compliance (with FERPA, for instance) are paramount in the collection, storage, transmission, and use of those data. This becomes especially important as institutions integrate third-party tools in the LMS. Central IT and LMS managers need to understand which student data and information may and may not be shared externally; proactive data policy creation can forestall issues down the road.

Ensure Adequate Infrastructure

LMS use continues to grow and change, which requires infrastructure planning. The LMS is a primary point for students to access course materials, which encompass videos, simulation, and other media as well as traditional text documents. Moreover, communications are now more interactive than threaded discussions. All this can lead to problems of adequate bandwidth, capacity, and storage. External and cloud-based LMS hosting can lead to security and traffic issues, perhaps requiring a review of firewall, single sign-on, and traffic-shaping solutions.

Engage Faculty

Faculty drive a successful LMS effort; an implementation can wither without active faculty support and usage. As LMSs adapt to the changing higher education environment, faculty engagement and feedback—through formal governance, forums, and/or surveys—are critical to ensure ongoing attention to their LMS requirements. In addition, faculty's technical proficiency must keep pace with LMS development in areas such as the operation of expanding tool sets and communication media, knowledge of and recommendations for relevant third-party plug-ins, and analysis of LMS data to activate early-alert and student-support services. CDS data indicate that 99% of institutions provide LMS training and support for faculty, but students and EDUCAUSE members nevertheless identified ongoing shortcomings of faculty ability as a potential problem, which heightens the need to continue to engage faculty in training and support. This requires ongoing system training, pedagogical support for course building, and just-in-time resources to address faculty's real-time questions and issues. And faculty are ready to learn more. The ECAR faculty technology study found that faculty are open to using more features of the LMS or using the LMS in more effective or innovative ways.

Where to Learn More

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About the Authors

Leah Lang (llang@edUCAUSE.edu) is manager of the Core Data Service at EDUCAUSE. Judith A. Pirani (Judith.pirani@gmail.com) is an EDUCAUSE Consultant and president of Sheep Pond Associates.

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Notes

1. Eden Dahlstrom, J. D. Walker, and Charles Dziuban, with a foreword by Glenda Morgan, *ECAR Study of Undergraduate Students and Information Technology, 2013*, research report (Louisville, CO: ECAR, September 2013), 11, available from <http://www.edUCAUSE.edu/ecar>.
2. Ibid, 4.
3. Ibid, 23.
4. Ibid, 37.
5. Ibid, 40.
6. Eden Dahlstrom, *ECAR Study of Faculty and Information Technology*, research report (Louisville, CO: ECAR, forthcoming).
7. Susan Grajek and the 2013–2014 EDUCAUSE IT Issues Panel, “Top-Ten IT Issues, 2014: Be the Change You See,” *EDUCAUSE Review*, March 24, 2014, <http://www.edUCAUSE.edu/ero/article/top-ten-it-issues-2014-be-change-you-see>.
8. Jacqueline Bichsel, *The State of E-Learning in Higher Education: An Eye toward Growth and Increased Access*, research report. (Louisville, CO: ECAR, June 2013, available from <http://www.edUCAUSE.edu/ecar>.
9. George Kroner and the Edutechnica team, “Does Your LMS Do This?” *EduTechnica.com*, January 7, 2014, <http://edutechnica.com/2014/01/07/a-model-for-lms-evolution/>.
10. Two of the top-ten IT Issues 2014 involved analytics (Issue 1: Improving Student Outcomes through an Institutional Approach that Strategically Leverages Technology, and Issue 5: Using Analytics to Help Drive Critical Institutional Outcomes), as well as two of EDUCAUSE’s list of 2014 top-ten strategic technologies (Technology 5: Learning Analytics: Course level and Technology, and Technology 10: Learning Analytics: Degree Advising). For more information, see Grajek et al., “Top-Ten IT Issues,” and Susan Grajek, *Higher Education’s Top-Ten Strategic Technologies for 2014*, research report (Louisville, CO: ECAR, February 2014), available from <http://www.edUCAUSE.edu/ecar>.
11. Grajek et al., “Top-Ten IT Issues.”