Learning Management System (LMS) Review

The University of Minnesota joined Unizin in Sept. 2014. Membership in the consortium is sponsored jointly by the Provost’s office, Office of Information Technology (OIT), and the Libraries. Part of the UMN’s membership obligation is to pilot Unizin’s chosen learning platform, Canvas. The term of the pilot was initially planned for fall 2015 through May 2016, but was lengthened and became a formal evaluation through December 2016.

The ULTA (University Learning Technology Advisors) faculty advisory group convened in Oct. 2016. Comprised of dean-appointed representatives from each Twin Cities college and system campus, ULTA members were asked to deliberate on a proposal that UMN continue as a member of Unizin and move to the Canvas learning management system (LMS).

The group will provide a recommendation to Executive Vice President and Provost Karen Hanson and Interim Vice President for Information Technology and Chief Information Officer, Bernard Gulachek for a final decision spring 2017. Read the Full Executive Summary
Current Situation - Concerns about Sustainability of UMN's Moodle System (Read the Full Section Report)

Moodle and the LMS Market

Moodle, as it stands today, creates concern for OIT leadership regarding its sustainability and position in the higher education market. Overall, it is not positioned to provide the strong and flexible environment the University will need in the very near future. Here are the primary concerns:

● There has been zero growth\(^1\) and no new customers in the U.S./Canadian Moodle Customer Base in the past year. From that same data, Canvas was chosen by 77% of institutions making a transition.\(^2\) This leads to concern about the future health and viability of Moodle.

● UMN experience over the past two years have confirmed that third-party vendors are more responsive to Canvas integration needs than they are to Moodle, a natural consequence of Canvas’s larger student enrollments compared to Moodle.\(^3\)

UMN’s Size and Complexity

Another concerning factor is that UMN’s Moodle implementation is an outlier in terms of size and system complexity. There are only a small number of higher ed institutions close to the size of UMN using Moodle – notably, Australia’s Monash University and the Open University in the U.K.

The Open University has approximately 170,000 active users. UMN’s size (and complexity) is in the same ballpark, making it one of the biggest Moodle installations in the world.

- 126,000 to 175,000 active users
- 8,000 to 10,000 concurrent users
- 15,000 active courses
- 90,000 total courses

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\(^1\) Market share\(^a\) represents the percentage of an industry or market's total sales that is earned by a particular company over a specified time period\(^b\) (Investopedia).

\(^2\) MarketsandMarkets: Getting the LMS Market Wrong, blog post by Phil Hill. July 31, 2016.

\(^3\) Experiences in the past two years that exemplify this issue: 1) at Qualtrics day at UMN in fall 2015, the community asked why there was no integration between Qualtrics and Moodle, when there was one for Canvas. Our service and business owners reached out to Qualtrics to pursue. Qualtrics was unresponsive to repeated attempts to discuss the issue; 2) in summer 2016, Moodle’s service owner, Jeff Weber, talked to Turnitin’s product manager about why they deliver their new version code late and why their Moodle plugin doesn’t work well. He responded that they would get to the Moodle updates but they are prioritizing Instructure’s Canvas integration higher.

The product manager added that Instructure gave them very specific instructions as to how to improve the vendor’s integration with Canvas. In some cases, Instructure has actually offered to help with the development or review/test solutions to make their integration stronger.
The vast majority (around 800) of U.S. higher ed institutions that use Moodle have fewer than 3,000 students enrolled. One-quarter of Moodle-using institutions have between 3,000-12,999 students enrolled. “Large” implementations — over 14,000 enrollments — comprise only a handful.

Since UMN is in the minority based on our size, development code fixes have not been prioritized since so few others experience the problems that are unique to large institutions. This also means we have fewer colleagues to confer with to share best practices and common solutions.

**Lack of Peer Institutions - Noteworthy stats**

- UMN is the only member of the Big Ten Academic Alliance (formerly CIC) to use Moodle.
- Among our 115 Carnegie R1 (Research 1) peers, only 8 use Moodle.

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4 E-Literate’s analyses are drawn from their exclusive access to the LMS market data of LISTedTECH, which has “the most complete and valuable educational technology data set available...Most of the data is updated regularly by LISTedTECH’s team and is validated at the source.” It includes data on 4,427 institutions in the US and Canada. For more information on data gathering methods, see Fall 2016 report, p. 20.

5 IT staff and leadership in higher-ed institutions maximize their resources and effectiveness by sharing knowledge of information technology practices, hardware and software, and vendors. This is done through IT professional development organizations and higher ed consortiums such as the Big Ten Academic Alliance (formerly the CIC).

6 The Carnegie Classification of Institutions of Higher Education is the leading typology of American colleges and universities. It is the framework in which institutional diversity in U.S. higher education is commonly described (from [http://carnegieclassifications.iu.edu](http://carnegieclassifications.iu.edu)).
Technical Challenges and Growing Expense⁷ (Read The Full Section Report)

With the growing complexity and size of the University’s Moodle system, it’s becoming difficult to justify the increasing investment of time and money. An analysis by the Office of Information Technology (OIT)’s Architect and Systems Integration staff describes the UMN’s Moodle installation as “running at a scale that Moodle’s architecture is not intended to support.”⁸

One complexity caused by the University’s large size is the need to maintain six years of separate “instances” of Moodle courses. Moodle hosts active courses for one year, then those courses need to be moved to the newest active instance, or, if not, will be available for five years before being taken offline. If an instructor wants to move their Moodle course to a new instance they must do it themselves or make a request. This approach is time consuming, especially when it is necessary to redesign courses from older instances to work with features and functionality that have been introduced in a newer instance. In modern, Software as a Service “SaaS” systems, this impact is reduced because the instance model is no longer needed. Courses will remain active without intervention, and are able to easily incorporate new system features on a continual basis as they are released.

Keeping six years of different versions of Moodle systems operating also requires dedicated staff and hardware. Each year, staff is needed to set the instance into production, and then prepare the next instance - research, installation, and testing. Over the past four years, Moodle usage has grown by 34% and to maintain it staff has nearly doubled. OIT’s infrastructure team has assessed the Moodle system and determined that a new infrastructure design is needed to prepare for future growth, and this would be a significant investment in staff time and hardware to achieve.

Since significant resources are being utilized to run Moodle, and will continue to grow into the future, that money, time, and staff could better be spent supporting the teaching and learning mission directly by growing in more innovative areas of the learning management system.

A consequence of this growth and hosting onsite makes the system more vulnerable and has also caused more planned and unplanned outages. This increase in outages causes significant conflict with students and instructors expecting a 21st century experience—easy, instant, and 24/7 access to the tools and content needed to teach and learn.

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⁷ The information in this section is from Infrastructure-OIT Moodle Assessment, an assessment performed by Architect and Systems line staff in OIT at UMN.
⁸ Infrastructure-OIT Moodle Assessment
LMS Market Review. Higher Ed Market Moving to SaaS and Cloud solutions *(Read the Full Section Report)*

Based on information from e-Literate’s LMS Market Dynamics reports, provided by MindWires LLC, the LMS market from 2003-2011 was described as a time when most institutions only moved to an LMS when they were forced to, i.e., when an LMS was discontinued or acquired by another company. Since 2011, this trend has begun to change due to more adoption of technical interoperability standards. Coupled with this is “availability of vendor hosting in general and cloud-based offerings in particular” as more institutions began to realize that its “benefits in system reliability and total cost of ownership can be substantial” (Spring, p. 4). As of 2016, 85% of LMS migrations are in hosted (“cloud”) solutions, while only 15% of institutions use an on-site LMS implementation.

**During the LMS evaluation, the University has examined two SaaS solutions. Canvas by Instructure and Moodle represented by Moodlerooms.**

**Instructure’s Canvas Growth**

Canvas’s emergence into the LMS market in 2010 was a key event in changing the choices available to higher ed institutions. Over the past year, Canvas has been selected by 69% of those institutions that are reviewing their LMS options, and, it has kept its early adopter customers (Fall, p. 4).

According to e-Literate,

*The net result [of migrations from one LMS to Canvas since 2011] is that a strong majority of new LMS implementations in US and Canadian higher education are currently coming from Canvas adoptions. While Canvas does not (yet) have the largest market share, its growth since 2011 has changed the nature of the academic LMS market. Importantly, rather than competitors primarily reacting to Blackboard and its strategic moves, the market is now reacting more to the attributes that have made Canvas successful:*

1. Cloud hosting  
2. Easy to use interface  
3. Strong customer support  
4. Improved grading and calendaring (Spring, p. 15).
Canvas Pilot Evaluation (Read the Full Section Report)

Methods:
- A usability study was conducted through Usability Services in OIT in which faculty and students were observed in realistic task scenarios.
- Evaluation data for all three semesters was collected via survey and focus groups for both faculty and students.

Usability Evaluation:
Report summaries are available at the links below.
- Summary Report for Canvas Learning Management System Usability Evaluation (faculty)
- Summary Report for Canvas Student Experience Usability Evaluation (students)

Canvas User Assessment
There were a total of three semesters included in the Canvas pilot. Overall, the results were consistent across all three.

Fall 2015 evaluation report
Spring 2016 evaluation report
The fall 2016 pilot included 66 students and approximately 5,000 students enrolled in 69 courses across each system campus.

Instructors who participated in the fall 2016 pilot were nearly evenly split in terms of Canvas experience: 34 had taught in previous semesters of the Canvas pilot, while 32 instructors were new to Canvas.

Of the responses received, 24 classes were face-to-face, 10 were a blend of face-to-face and online, and nine completely online.

LMS Preference
Both students and instructors were asked which LMS they preferred. As in previous semesters, both groups expressed a moderate preference for Canvas over Moodle.
Q. “Overall, which course management system helps you better to succeed in your classes?” and “is better for your teaching?”

**Student LMS Preference Response**

<table>
<thead>
<tr>
<th>System</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canvas</td>
<td>581</td>
</tr>
<tr>
<td>Same</td>
<td>263</td>
</tr>
<tr>
<td>Moodle</td>
<td>308</td>
</tr>
</tbody>
</table>

**Instructor LMS Preference Response**

<table>
<thead>
<tr>
<th>System</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canvas</td>
<td>24</td>
</tr>
<tr>
<td>Same</td>
<td>12</td>
</tr>
<tr>
<td>Moodle</td>
<td>5</td>
</tr>
</tbody>
</table>

Q. “In your opinion, should the University switch learning management systems?”

**Students**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>680</td>
</tr>
<tr>
<td>No</td>
<td>461</td>
</tr>
</tbody>
</table>

**Instructors**

<table>
<thead>
<tr>
<th>Response</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>8</td>
</tr>
</tbody>
</table>
Select Student and Instructor Comments From the Canvas Pilot

Students

- “I’ve had plenty of professors say ‘we care about you, we want you to do as well as possible’ but if you want us to do as well as possible, then you need to use the interface to its fullest capability so that it’s as easy for us [to navigate and understand what is expected] as possible.”

- “If professors know what they are doing on the web site, I think it will ... reassure students that everything is planned.... It will be easier for students to transition to a new system. If they do it well, then students will think, ‘wow, this is great.’”

- “I can live with either. My success in the course does NOT depend on the learning management system.”

Instructors

- “With Moodle, it’s like having a garage filled with car parts. Canvas is actually like having a car in the garage. With Moodle, you can actually assemble whatever car you want if you know how to put together a car. With Canvas, I have something I can pull out of the car and drive with ... but it’s the chosen car.”

- “Since technology by its nature is always changing, it’s also a matter of you making it clear to faculty that no LMS will last forever and that change (whether upgrades or transitions to different LMS) is inevitable. And change can be a good thing if it helps faculty reflect on their teaching practices and improve them instead of repeating the same old models.”

- “If people think that systems are going to change ‘every five minutes,’ then people will stop investing in the change.”
Canvas Technical Issues and Considerations *(Read the Full Section Report)*

Instructure provides a cloud-based Canvas hosted solution through Amazon Web Services and employs a continuous delivery, upgrade-in-place strategy. Long-term advantages include a common production environment and stable user identities within the system; however, it also introduces complexities and challenges in dealing with a three-week change cycle with limited options to control.

Overall, Canvas availability and performance has been good during the pilot period. There were a few outages and periods of degradation; however, overall uptime exceeded 99.966% or 21 minutes yearly, compared to our onsite Moodle which was 99.557% or 1 day 14 hrs 49 min yearly.

Canvas’ tools and features met or exceeded virtually all of the requirements for the functional areas defined by the technical team. It offers the necessary technology to allow integrations to University Systems, University developed tools, and third-party tools. It also offers numerous pieces of analytics and reporting functionality.

To transition courses, Instructure provides a converter facilitating the import of Moodle content and activities into a Canvas course site. In practice, this process proved efficient and relatively problem-free, requiring only that instructors or course designers re-organize and contextualize the imported course content.

Moodlerooms/Canvas Accessibility Comparison *(Read the Full Section Report)*

Canvas and Moodlerooms both design their systems to minimize issues with accessibility and to meet a number of accessibility guidelines and standards. Both offer tools to evaluate conformance with accessibility standards under Section 508 of the Rehabilitation Act and the Act WCAG 2.0 AA Standards.
System Flexibility and Adaptation

LMS offerings in the market today can be categorized as either open-source or proprietary. UMN’s current onsite Moodle instance is open source, meaning the University is able to copy and modify the code base as needed, paying no cost to a vendor. Because of the way our infrastructure is architected, making this code work with the other systems at the University requires portions to be rewritten each year with the creation of a new instance.

As more and more code is added to the base system to allow it to function with each widely varying customization, the LMS can become more susceptible to instability, reliability issues, and potential security risks. By continually having to reintegrate applications and maintaining the code to keep the LMS functional, other development projects that could improve the pedagogy are neglected.

Canvas and Moodlerooms are considered open source as well, but in contrast to a community-driven process, a vendor directs the development of the software. This causes concern for some because it could be assumed that the University loses the flexibility required to customize the LMS for the University’s unique and specific needs. However, flexibility in systems like Canvas and Moodlerooms is achieved through integrations. These integrations are built using common standards, which means that they provide a modular approach to customize the LMS more easily and efficiently - in ways that don’t require extensive development and support to create custom integrations. With this model, the University, or even individual users and units, can customize aspects of the LMS to best meet their needs, instead of requiring the LMS code base to be rewritten for the entire user base. This is especially useful when only a small subset of users might want a specific function or tool.
Next Generation Digital Learning Environments (NGDLE) (Read the Full Section Report)

The next generation digital learning environment (NGDLE) is a key influencer for the University of Minnesota when considering appropriate paths towards the future of higher education. The NGDLE is a framework outlined in a research report by EDUCAUSE. The report describes how the future will focus on creating an environment or ecosystem of interconnected learning tools built on common standards.

What does an NGDLE look like?

EDUCAUSE relates it to Lego bricks, or a “toolbox of applications, content and platforms that could be assembled in custom ways” based on how the individual or institution wants to build it. These Lego bricks represent a variety of learning technologies built using common standards and can be customized to create an interoperable, seamless and customized learning environment that can fit unique individual or departmental goals. Since standards-compliant data is freely shared amongst the components, analytics would be easier to gather and make use of. The use of analytics could create a more personalized experience that helps students, faculty, and advisors to set program and individual learning goals and objectives, and track progress toward mastery or completion.

Since these goals often go beyond current LMS functions, an NGDLE would speed progress toward new models of education like competency-based, adaptive, and personalized learning.

For an NGDLE to function as envisioned it must:

- Support interoperability and maximize ease of use
- Facilitate customization and personalization of learning environments
- Increase the availability and power of analytic tools targeted to learners, instructors, advisors, and academic administrators
- Enhance and enrich learning assessment
- Enable collaboration across courses, programs, and institutions
When the University joined the consortium in 2014, it was a strategic investment, driven by the opportunity to create and influence solutions that focused on improving the future of higher education and digital learning. Unizin has created the opportunity to work together and leverage partnerships with other like-minded institutions who are working towards the same goals.

In addition to the benefits of collaboration, Unizin provides access to new digital learning technologies and services which are already being piloted at the University. As part of the LMS evaluation, Unizin is being evaluated for its potential (with the use of Canvas) to move the University closer to where the future of digital education is going and create a next generation digital learning environment.

The three areas of focus for Unizin are 1) digital content, from creation, to curation, discovery, collaboration, and sharing; 2) learning platform to deliver content, with the requisite extensibility to support a ‘plug-in’ architecture, easily customizable by member institutions, and 3) learning analytics.

Based on trends in higher education technology and work currently underway at our peer institutions, we project that the tools and services that we are developing with Unizin will be needed and expected by UMN faculty and staff within the next 1-5 years. Specifically, we anticipate demand in the Unizin-focused areas of digital content creation, management and sharing (including open educational resources) and learning data analytics.

By continuing down the path of partnership in the Unizin consortium, UMN’s learning ecosystem will be able to grow, becoming the powerful platform that fosters a world-class teaching and learning experience.
System Transition and Ongoing Operational Costs

Operational costs between current Moodle and SaaS options

The table below summarizes the estimated costs incurred with each LMS. Staffing estimates for MoodleRooms and Canvas are based on current staffing costs of supporting our onsite Moodle system.

<table>
<thead>
<tr>
<th></th>
<th>Current Moodle</th>
<th>Moodlerooms SaaS</th>
<th>Canvas SaaS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Vendor Payments</td>
<td>$8,000</td>
<td>$1,134,000</td>
<td>$810,000</td>
</tr>
<tr>
<td>Total People</td>
<td>$1,661,000</td>
<td>$1,227,000</td>
<td>$1,227,000</td>
</tr>
<tr>
<td>Total Infrastructure Costs</td>
<td>$221,000</td>
<td>$0</td>
<td>$0</td>
</tr>
<tr>
<td><strong>Total All Costs</strong></td>
<td><strong>$1,890,000</strong></td>
<td><strong>$2,361,000</strong></td>
<td><strong>$2,037,000</strong></td>
</tr>
</tbody>
</table>

The 24/7 availability, reliability, and security an SaaS LMS brings does come at a higher cost, as the table above indicates. However, it avoids the significant recurring “capital” investments of hardware and infrastructure of an onsite system and the growing costs of increased staffing and support that our current Moodle system has experienced. SaaS greatly reduces risk to the University when compared to an onsite system. In the case of a Canvas, SaaS provides the gateway to Unizin’s tools, services, and consortial benefits.

Value beyond the LMS

As explained earlier in the Unizin section, we are anticipating the future teaching and learning needs in the areas of digital content, learning analytics and the ability to expand the ecosystem. The figure below compares the cost of supplying these tools for a learning ecosystem through Unizin to the cost of acquiring them from vendors. Notes are provided to explain estimates as needed. Staff costs are based on YTD OIT staff reporting.

<table>
<thead>
<tr>
<th>Unizin/Canvas</th>
<th>Projected Non-Unizin (Moodlerooms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consortium Fee</td>
<td>$427,500</td>
</tr>
<tr>
<td>Course Management System</td>
<td></td>
</tr>
<tr>
<td>Licensing Fees</td>
<td>$810,000</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>N/A</td>
</tr>
<tr>
<td>Staff</td>
<td>$1,227,000</td>
</tr>
<tr>
<td>Real Time Data Feed</td>
<td>$30,000.9</td>
</tr>
<tr>
<td>Content</td>
<td></td>
</tr>
<tr>
<td>Repository</td>
<td>Included</td>
</tr>
<tr>
<td>Discovery</td>
<td>Included</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9 $500 a month + .25 of FTE Sys Admin (MoodleRooms or self-hosted)

10 Equella is a digital content repository owned by Pearson, analogous to Unizin’s Content Relay. This estimate is from U of Utah; they pay $175,000 (with 31,000 IPED student enrollment).
<table>
<thead>
<tr>
<th>Service</th>
<th>Included</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authoring</td>
<td>Included</td>
<td>$15,000.00 (UMN Libraries cost to host Pressbooks)</td>
</tr>
<tr>
<td>Engage</td>
<td>Included</td>
<td>$75,000.00</td>
</tr>
<tr>
<td>Analytics</td>
<td>Included</td>
<td>$462,000.00 (Early-warning Dashboard)</td>
</tr>
<tr>
<td>Analytics Support Services</td>
<td>Included</td>
<td>$1,500,000 (Projected EAB fees)</td>
</tr>
<tr>
<td>Unizin Data Warehouse</td>
<td>Included</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$2,464,500 $4,743,000</td>
</tr>
</tbody>
</table>

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11 Blue Canary provides a data dashboard; this estimate is based on their price for an institution the size of UMN. Interesting note: Unizin considers using Blue Canary instead of developing its own dashboard, but then Blackboard bought it.

12 EAB is an enterprise-level student, data, and learning analytics application. It generally requires extensive consulting services from the vendor in order to customize it to institutional needs. This estimate is conservative and based on reports from peer institutions.
Conclusion

Today, the University finds the future of its academic technology at a directional crossroad. We must decide if it is prudent to stay the course or if it’s time we join our peers in creating the future of academic technology. Three years ago our institution began this investigation and investment in a consortium dedicated to helping shape the future of learning. That beginning has since led us on a journey of exploration and learning far beyond initial expectations.

Like any technology, an LMS is never exempt from progress, and that progress in recent years has been moving at a rapid pace. Unizin/Canvas and Moodlerooms have all been at the forefront of this transformation and are rapidly developing their platforms to meet the pace of that change in higher education. As we gauge the learning landscape as it exists today, and the campus climate around this transition, we understand, and cannot overstate, the incredible impact this decision will have; not only on the day-to-day functions of all teachers and learners, but also in how we will be are able to position the University competitively for years to come.