

# Learning Management System Review

Learning Management Systems (LMS) are critical educational tools in institutions of higher education. They are a helpful and necessary technological tools that foster interaction among students, teachers and content as well as enabling a range of pedagogical approaches to enhance learning. Arguably, the LMS has become an necessary interface for how universities connect with students and outside communities as they are often used to host online projects, interactive initiatives and public-facing modules, in addition to traditional courses. Like all technology tools, the LMS requires maintenance, modification and upgrades to stay current and usable.

Carleton’s LMS, branded cuLearn, is a Moodle platform which was adopted in 2012 after substantial review. (A more complete background on the history of the LMS can be viewed in Appendix 1.) After seven full years of use, Teaching and Learning Services (TLS) has begun a full review of cuLearn to determine whether we can improve the existing system to meet the Carleton community’s growing needs, or whether we should adopt another LMS altogether.

Common features and functions of any LMS include content publishing, communication, collaboration, assessment, and administration. Since 2012, LMS products have become increasingly more sophisticated and include integrations for tools like online classrooms, media management tools, portfolios and data analytics packages. Beyond the suite of tools, the LMS gives faculty the space and structure to design courses and organize content iteratively and practice continuous improvement in their classes and creates a community of practice around teaching. LMS products can also support institutional priorities like student engagement, community outreach, and support reporting of student and program outcomes.

## LMS Ontario Landscape

Carleton is one of three institutions in the province to use the Moodle platform with an increasing concentration of institutions using the Brightspace platform. Recent significant adoptions of new platforms are uToronto and UBC that adopted Canvas in 2018. It is worth noting that our Education City partners all use Brightspace as their LMS. As we develop the Education City partnership, using a common learning management system among partners would facilitate cross-institutional collaboration and work and help students move from one institution to another with ease.

### Summary: Ontario Institutions

Product	Number of Institutions	Percentage
Brightspace	9	(45%)
Blackboard	4	(20%)
Moodle	3	(15%)
Canvas	2	(10%)
Sakai	2	(10%)

### Ottawa Area Institutions

Algonquin*	Brightspace
La Cite*	Brightspace
uOttawa*	Brightspace
uSt.Paul*	Brightspace
Carleton University*	Moodle
uOutaouais	Moodle
Dominion	N/A

## cuLearn Use

cuLearn is used extensively at Carleton by students, instructors and staff. It is perhaps the most used system at Carleton, with nearly all students accessing the system on a daily basis. In Fall 2018, 83% of all instructors use cuLearn for some aspect of their teaching.

\* Education City partners.

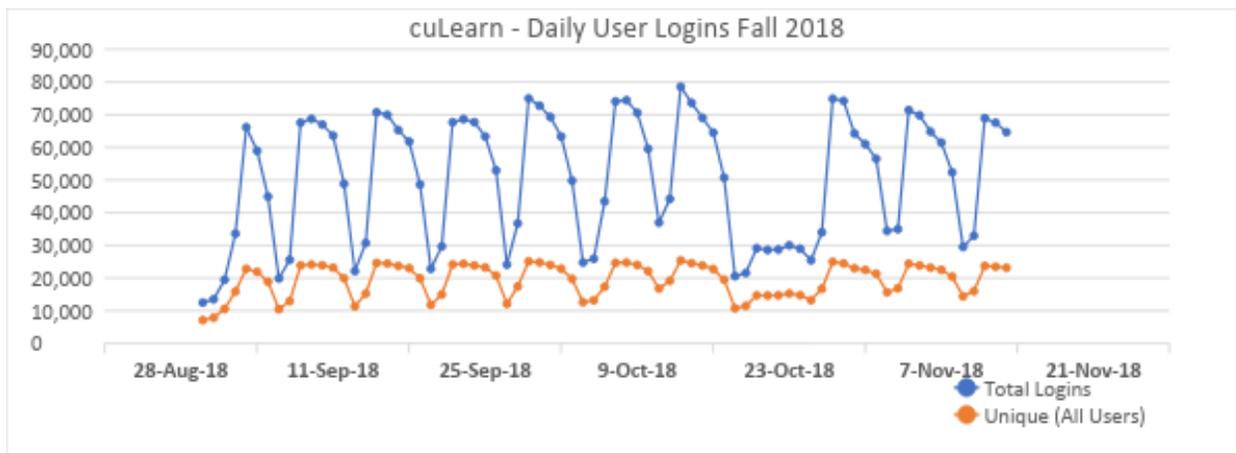


Chart 1: Daily logins in cuLearn, Fall 2018.

Every academic term, all course sections (face to face, blended, and online) are populated automatically into cuLearn, meaning that instructors who choose to use cuLearn in their courses, are able to do so immediately.

cuLearn is also used by all staff members at Carleton for a variety of mandatory and non-mandatory training programs, including AODA and Environmental Health and Safety, which are hosted inside it and integrated with Banner. The system is also used by various interest groups for sharing resources and discussions - for example, departmental curriculum review groups, first year seminar instructors, departmentals' pedagogy groups, Teaching Mentors, Carleton Leader, etc. In addition, the system is used by Carleton University Research Ethics boards, and in some cases by individual instructors to conduct their SoTL research studies inside cuLearn. The Faculty of Engineering and Design uses cuLearn for the Self-assessment diagnostic questionnaire, and the personalized engineering learning support.

## Public Facing cuLearn

Carleton maintains a public facing version of cuLearn called eCarleton ([eCarleton.ca](http://eCarleton.ca)), which provides a way for individuals external to Carleton to access teaching and learning materials. eCarleton is used to host open educational resources, including open courses, continuing education initiatives, NSERC grant projects, externally funded projects (for example, the Ontario Internationally Educated Nurses course consortium), and other materials that require access by members of the external community. eCarleton mirrors cuLearn, meaning that content can be created and moved between the two platforms easily

## Moodle at Carleton

The initial adopted version of Moodle at Carleton was version 2.1. The current version at Carleton is Moodle 3.1.11. (The most recent release of Moodle is 3.5.3, with 3.6 expected in December 2018).

## Moodle Resourcing

Support for Moodle is provided by two units at Carleton, the Educational Development Centre (EDC) through its Educational Technology team, and several teams in Information Technology Services (ITS).

Unit	Staffing (FTE)	Responsibility	Notes
Educational Development Centre (EDC)	4.75	Faculty member training and support Documentation Functional testing of system Pedagogical support and leadership	Includes a mixture of continuing and casual employees. Varies based on available funding.
Information Technology Services (ITS)	1.95	Administration, technical support, database support, hardware support, student support, technical testing, infrastructure load testing, assessing and addressing issues that are raised by the EDC.	Continuing employees.
Dualcode (external service provider)	n/a	Technical support and advising.	

Table 1 – LMS Resourcing at Carleton

Given the current manner that Moodle is configured and operated at Carleton, there are not enough resources allocated to support Moodle. This has been demonstrated repeatedly in the last three years. The system has not been upgraded since 2016, nor have we been able to fix or improve outstanding issues, or address performance problems in large classes.

From a pedagogical support model, staffing in the EDC should focus on supporting instructors on using the tool to empower learners and simplify administrative issues, instead they spend too much time on minor issues caused by the complexity or configuration of the platform.

**Performance of cuLearn**

cuLearn is a mission critical service and is consider a tier 1 supported service by ITS. cuLearn is self-hosted in the ITS data centre. The hardware that supports its operation is significant:

1. Two redundant load balancers
2. Six Application Web Servers
3. Two redundant Database Servers with automatic synchronization and automatic failover.
4. Storage Area Network (SAN) – fully redundant.

This architecture has created a highly reliable system. However there are very significant performance problems with the cuLearn as it relates to responsiveness of the system, particularly for instructors teaching large classes or complicated assessment strategies (many entries in the gradebook). Instructors have reported page load times of minutes. When a large class is completing an quiz at the same time, the system can become unresponsive and cause a flurry of support calls and stress for students.

Despite efforts to investigate and address performance problems, little improvement has been made. This could indicate that the design of Moodle is not able to support the type of performance required by the Carleton community or there are unknown issues in the architecture and design of Carleton’s implementation.

\* Education City partners.

## Pathways Forward

There are two possible outcome from the review for cuLearn:

Outcome 1	Outcome 2
<p>Maintain Moodle as platform, but enhance it.</p> <p>For example, move it into cloud, or re-architect self-hosting model. Add ITS expertise.</p>	<p>Change platform (Canvas or Brightspace).</p>
<p style="text-align: center;"><b>Advantages</b></p> <p>Likely relatively low investment.</p> <p>May substantially improve performance of the system.</p> <p>May reduce challenges related to upgrading and keeping system current.</p> <p>No disruption to users.</p> <p>Potentially allows adjusting and aligning staffing to different priorities.</p>	<p style="text-align: center;"><b>Advantages</b></p> <p>Potentially better platform for Carleton’s users, with features that better support faculty, students, and administrators.</p> <p>Reduces/eliminates challenges with upgrading and keeping system current.</p> <p>Enhances reliability and addresses performance concerns of platform.</p> <p>Modern user interface.</p> <p>Potentially allows adjusting and aligning staffing to different priorities.</p> <p>Off loads some testing and integration requirements.</p> <p>Provides an opportunity for transformative change to teaching.</p>
<p style="text-align: center;"><b>Disadvantages</b></p> <p>Additional costs for hosting.</p> <p>Uncertainty over providers.</p> <p>Potential security and privacy challenges (likely dependent on provider).</p>	<p style="text-align: center;"><b>Disadvantages</b></p> <p>Additional significant costs for licensing and hosting.</p> <p>Transition and implementation costs</p> <p>Learning curve for faculty and students including ITS and EDC staff members.</p> <p>Additional work /resources required to integrate ARES (Library reserves), Banner, Student emails, Scantron, etc.</p>

Table 2: Possible outcomes from LMS Review

## LMS Product Comparison

Based on the market and mindshare (Appendix 3), there are three LMS platforms that should be considered, Moodle, D2L Brightspace and Instructure Canvas.

	<b>Moodle</b>	<b>D2L Brightspace</b>	<b>Instructure Canvas</b>
Open vs Closed	Open source	Closed	Open source
Meets Accessibility Standards	Yes - however requires expertise.	Yes	Yes
Strengths	Powerful and highly customizable Excellent language support Frequent updates cycle	Revised and clean UI Strong competency education elements. Intelligent agents Strong language support	Known for modern interface Instructors indicate easy to use Open source code Designed for students
Cloud hosting	Limited. Commonly self-hosted by institutions	Rebuilt for Software as a Service model.	Purpose built for Software as a Service model
Market share	4th most popular LMS. Slowly declining market share in North American institutions	3 <sup>rd</sup> most popular LMS. Stable market share.	Most quickly growing LMS Increasing market share (at the expense of Blackboard)
Extendibility and integration standards	Highly extendible; strong support for standards	Strong support for standards. May not be as extendible as others.	Very strong support for standards for interoperability.
Analytics	Present. Enhanced in newer versions. Allows complete access to database if self-hosting.	Analytics presented to instructors in a useful and productive way. Analytics available to institution, however not clear how rich these are.	Analytics presented to instructors in a useful and productive way (may not be as strong as Brightspace). Institutional access to data may be deeper than Brightspace. Can roll up data from rubrics and tests at a system level.
User accounts	Highly configurable	Highly configurable	Highly configurable.

Table 3: LMS Product Comparison

## Timeline for Review

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### November-December 2018

- Initial discussion with LMS Steering committee
- Establish Project roadmap
- Identify Working group
- Support Working group with documentation from partners and previous reviews
- Review current LMS history, policies, support strategies and user statistics
- Prepare Communication plan

### January-April 2019

- Define scope of needs analysis/requirements for LMS
- Gather feedback from users /conduct focus groups with faculty , students, and staff
- Review of feedback by Working group
- Develop Needs document
- Develop RFP

### May-December 2019

- Working group to review RFP submissions
- Develop rubric and criteria for scoring LMS tools
- Schedule demonstration of LMS tools
- Setup instances and demo accounts for all users
- Gather feedback on each tool from faculty, students, staff
- Working group to recommend LMS tool to be adopted
- LMS selection decision made
- The decision about LMS communicated to Carleton community

### January-April 2020<sup>1</sup>

- Rudimentary configuration of system
- Functional and technical testing and integration with other Carleton's systems
- Identify users who will participate in scale up
- Train EDC and ITS staff
- Engage early-adopters - faculty and staff - to support implementation
- Prepare training and support documentation
- Ongoing communication to Carleton community

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<sup>1</sup> If decided to replace Moodle with a new LMS

\* Education City partners.

**May –December 2020<sup>2</sup>**

- Course content migrated to new LMS
  - LMS campus-wide training
  - New LMS implemented in all Summer 2020 courses
  - System and utilization metrics developed and implemented
  - Old LMS decommissioned
  - Draft of report
  - Seek feedback from stakeholders
  - Ongoing communication to Carleton community
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<sup>2</sup> Same as footnote #1

\* Education City partners.

## **Appendix 1: Background on the LMS at Carleton**

### **Past and Present – LMS**

The Physics Department implemented and supported Carleton's first learning management system (LMS), WebCT between 1998 and 2000. In 2001, ITS took responsibility for providing central support for WebCT. From 2001 until 2011, Carleton remained with the WebCT product line, upgrading as the vendor (initially WebCT and then Blackboard) released new versions. In 2011, the university conducted a review and solicited proposals for a new LMS platform. The decision to review the platform was driven in large part by Blackboard that declared the WebCT product line 'end of life'. It should also be noted that the Department of Electronics used their own instance of Moodle in selected courses during this period even though WebCT was the only centrally supported LMS.

During this review three products were considered, these were Desire2Learn, Blackboard Learn, and Moodle. Extensive testing by faculty and students identified a small preference for Blackboard over Moodle, with Desire2Learn further behind. During the RFP process, a self-hosted Moodle was selected as it was identified by ITS and TLS as best meeting Carleton requirements. The aggressive upgrade cycle, openness of the platform, and use of standards was seen as being attractive, as other platforms were closed and upgrades were slow and often problematic.

The vision for the LMS was one of a hub and spoke model. With the LMS being the hub and other tools (spokes) connecting in using standards as required to expand functionality. This has been realized in some capacity, with the addition of tools like Mahara (cuPortfolio), BigBlueButton (virtual online classroom), Kaltura (media authoring and management), and ARES (Library reserves).

Moodle 2.1 was implemented in 2012, with Carleton upgrading in the May time period. As of November 2018, Carleton is using Moodle 3.1 (released May 2016). The most current version of Moodle is 3.5.3, with Moodle 3.6 anticipated to become available by the end of December 2018. Carleton did not upgrade Moodle in 2017 or 2018.

Upgrading Moodle from a technical perspective is relatively straightforward. However there is significant validation testing that is required to ensure that the system is working as intended for the Carleton community. Depending on the significance of the upgrade, it can require two to four months of work from ITS and EDC teams.

The most serious incident with cuLearn occurred in Moodle version 2.8.3. Moodle changed the functionality of the gradebook, with little documentation provided. This created issues in cuLearn grading scheme, which required a review of all students' grades. Significant resources in ITS, EDC, and RO were employed until the Moodle community created a fix and Carleton made upgrade to Moodle 2.3.8. Since then there have been no significant incidents; however the speed of the system may be problematic when working with large class size.

## Appendix 2: Ontario University LMS Platforms

<b>Ontario Universities</b>	<b>Platform</b>
Brock	Sakai
Carleton	Moodle
Lakehead	Brightspace
Laurentian	Brightspace
McMaster	Brightspace
Nipissing	Blackboard
OCADU	Canvas
Queens	Brightspace
RMC	Moodle
Ryerson	Brightspace
Trent	Blackboard
uGuelph	Brightspace
uOttawa	Brightspace
uToronto	Canvas
uWaterloo	Brightspace
uWestern	Sakai
uWindsor	Blackboard
UOIT	Blackboard
Wilfred Laurier	Brightspace
York	Moodle

### Appendix 3: North American LMS Marketshare

Product	2012	2013	2014	2015	2016	2017	2018
<b>Canvas</b>	<b>4.5%</b>	<b>8.4%</b>	<b>11.3%</b>	<b>14.5%</b>	<b>21.5%</b>	<b>29.4%</b>	<b>34.7%</b>
<b>Blackboard Learn</b>	<b>43.0%</b>	<b>43.2%</b>	<b>42.9%</b>	<b>42.4%</b>	<b>39.7%</b>	<b>35.6%</b>	<b>32.8%</b>
ANGEL	6.9%	4.8%	3.0%	0.9%	0.4%	0.0%	0.0%
<b>D2L Brightspace</b>	<b>11.1%</b>	<b>13.1%</b>	<b>13.7%</b>	<b>14.3%</b>	<b>14.6%</b>	<b>15.0%</b>	<b>14.5%</b>
<b>Moodle</b>	<b>15.1%</b>	<b>15.7%</b>	<b>15.3%</b>	<b>15.2%</b>	<b>14.1%</b>	<b>12.8%</b>	<b>12.8%</b>
Sakai	5.1%	5.3%	5.3%	5.1%	3.9%	3.1%	2.7%
Pearson LearningStudio	3.1%	3.1%	3.1%	2.3%	1.7%	0.1%	0.0%
Other	1.6%	1.6%	1.7%	1.7%	1.6%	1.4%	1.3%
Homegrown	4.5%	3.9%	3.7%	3.3%	2.4%	2.3%	0.9%
Schoology	0.0%	0.0%	0.0%	0.1%	0.2%	0.2%	0.3%
WebCT	5.2%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%
Total (NA = US & Canada)	<b>100%</b>						

e-Literate (<https://mfeldstein.com/na-he-lms-market-share-enrollments-for-2012-2018/>)