

UMN Canvas Pilot – 2015-2016 Report

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2 EXECUTIVE SUMMARY

2.1 CANVAS PILOT AT UMN

In September 2014, the University of Minnesota joined the [Unizin](#) consortium as part of a joint sponsorship between the Provost's office, Office of Information Technology (OIT), and the Libraries. Part of UMN's obligation as a Unizin member is to pilot Canvas. The term of the pilot was initially planned for fall 2015 through May 2015.

At the request of the Canvas project team leads, Unizin sponsors Provost Karen Hanson, CIO Bernard Gulachek, and University Librarian Wendy Lougee agreed to extend the Canvas pilot through the spring 2017 semester to formally evaluate and compare Canvas to Moodle (see section 3.2 for justification).

2.2 WHAT IS CANVAS?

Canvas, hosted through Instructure, is a relatively new online learning platform, or learning management system (LMS) that has been favorably received and adopted by [many of UMN's peer institutions](#). Some beneficial features include: cloud-based functionality, a clean, intuitive user interface with drag and drop usability, close integration with social media, and a comprehensive grading tool.

2.3 CANVAS PILOT PARTICIPATION

Between the fall 2015 and spring 2016 semesters the Canvas pilot project team successfully doubled the size of pilot for the upcoming fall 2016 and spring 2017 semesters. Additionally, this pilot will include a broader set of faculty and courses from a variety of departments, colleges and the system campuses, as well as large enrollment courses and courses that depended on LMS integrations such as the i>clicker student responses system or Turnitin plagiarism checking service.

Campus ¹	Instructors	Student Enrollment
Crookston	5	101
Duluth	9	292
Morris	7	168
Twin Cities	44	2,358
	65	2,919

Table 1 - Spring 2017 Canvas Pilot Participation

2.4 USER ASSESSMENT

Feedback on Canvas was elicited from faculty and students by survey and focus group for each semester. Canvas usability studies were also conducted with the faculty and students. Below are the results of the larger spring 2016 semester pilot. (A summary of fall 2015 evaluation results is included in section 4.2 in the full report.)

2.4.1 Spring 2016 Evaluation Results

2.4.1.1 Instructors

- Over 90% of instructors found Canvas either moderately useful or extremely useful. Approximately the same percentage found Canvas easy to learn, saying that they grew comfortable after several weeks or less of using the tool.

¹ The Rochester campus expressed concern about the discontinuity between courses participating in the pilot would experience and so elected not to participate; however, the fall 2016 pilot may include Rochester courses.

- Over 80% of the instructors were either satisfied or very satisfied with all 11 Canvas features polled.
- When asked for their preference between Moodle and Canvas, 53% of the 62 instructor respondents preferred Canvas, 29% preferred Moodle, and 18% remained neutral.
- 37% of instructors would like the University to support multiple systems, 32% were neutral, and 31% would choose to support a single LMS.
- Most instructors acknowledged tradeoffs between Canvas and Moodle (see section 4.3.5, Instructor Focus Group Summary). Canvas was described as being modern, intuitive, easy to learn, and particularly good for assessment and communication, but it lacked some customization abilities, and some worried that the University would be dependent upon a third party to run the tool and answer inquiries. In contrast, Moodle was described as being customizable, open source, and university-controlled. It was also depicted as seeming out of date, lacking mobile capability, and a challenge to learn in-depth.

2.4.1.2 *Students*

- Like the instructors, 90% of the students felt comfortable with Canvas within several weeks or less of using it.
- Approximately three quarters of the students were either satisfied or very satisfied with the mobile app.
- Students preferred that the University support a single LMS (79%),
- When asked for their preference between Moodle and Canvas, 46% of 836 student respondents preferred Canvas, 33% preferred Moodle, and 21% remained neutral.

See section 4.3.7, “Pedagogical Observations,” for a selection of participant anecdotes related to teaching and learning in Canvas.

2.4.2 Usability Study Results

After participating in the usability study, participants were also asked to rate Canvas on a System Usability Scale (SUS)². Instructors gave Canvas an average SUS of 61; students gave Canvas an average SUS of 76 (an average score is 68).

2.5 TECHNICAL EVALUATION

The Canvas project team performed a full technical evaluation (see section 5) and made the following observations about its features and performance:

- **Release schedule:** Instructure provides a new release of Canvas with interface changes every three weeks. These require no downtime. Most are small, but would still require awareness and management by IT. The timing of when larger changes are made can be controlled by UMN administrators.
- **Performance:** Canvas scored well on availability and performance during the pilot period. Overall uptime exceeded 99.5%.
- **Tools and features:** Canvas met or exceeded virtually all of the requirements for the functional areas defined by the technical team. It offers the functionality and usability that is needed and expected from a LMS (see section 5.3).

² The [SYSTEM USABILITY SCALE \(SUS\)](#) is the most widely used standard questionnaire for measuring the perception of usability. First developed in 1986, it has been used on software, websites, mobile phones, hardware, interactive voice response (IVR) systems and even paper ballots. It has been cited in over 600 research publications and is part of leading commercial usability-evaluation tools” ([Usability Evaluation Summary Report](#), p. 7). While interpretation of the SUS depends on many factors, the average SUS score is 68.

- **Accessibility:** to minimize problems with accessibility, Canvas was developed using modern HTML and CSS technologies. Instructure is committed to W3C's Web Accessibility Initiative and [Section 508](#) guidelines. (see section 5.3.7).
- **Integrations:** Canvas offers the necessary technology to allow integrations to University systems (see section 5.7), University-developed tools, and third-party tools (see section 5.5).
- **Course migration:** a converter is available to facilitate the import of Moodle content and activities into a Canvas course; it was successfully used during the pilot. It requires instructors or course designers to re-organize the content once in Canvas. To move large quiz question databanks, use of the Respondus Quiz tool is required.
- **Support issues:** UMN pilot participants initiated a total of 123 requests for help for both semesters of the pilot. Most reported issues were either transient or only affected a single user or (if a design issue) a single course (see section 5.9.1).
- **Analytics and reporting:** Canvas offers a variety of analytics and reporting functionality: student-facing, instructor-facing, and administrator/researcher-facing (see section 5.10.)

2.5.1 Features Comparison

The Canvas pilot project team performed an [analysis](#) of tools and features available in both Canvas and Moodle. Generalizing, there are more customization options in Moodle, but the tools and functions available in each are largely the same.

Exceptions of note are the Lesson and Glossary tools in Moodle – not available in Canvas – and the SpeedGrader tool in Canvas, which is not available in Moodle.

2.6 PREPARATION FOR FINAL LMS RECOMMENDATION

In the fall 2016 semester, evaluation will be broadened and data mined from both Canvas and Moodle to provide the most fair and comprehensive picture.

The Canvas pilot will be overseen by an advisory board composed primarily of faculty from each college and system campus. It will provide input and advice to the Canvas project team, and ultimately provide a recommendation to Canvas pilot sponsors based on the Canvas project team's final report (see the timeline below).



UMN Canvas Pilot – 2015-2016

Full Report

3 BACKGROUND

The University of Minnesota joined the [Unizin](#) consortium in September 2014 as part of a joint sponsorship between the Provost's office, Office of Information Technology (OIT), and the Libraries. Part of UMN's obligation as a Unizin member is to pilot the learning platform Unizin has chosen, the Canvas Learning Management System (LMS). The term of the pilot was initially planned for fall 2015 through May 2015.

Canvas, hosted through Instructure, is a relatively new online learning platform that has been favorably received and adopted by [many of UMN's peer institutions](#) in higher education. It is cloud-based, offers a clean, intuitive user interface featuring drag and drop functionality, is closely integrated with social media, and offers a comprehensive grading tool.

3.1 FALL 2015 PILOT

The fall 2015 evaluation pilot, managed by the OIT Academic Technology group, involved 20 courses and instructors and between 700-800 students. Instructors' courses were copied from Moodle (UMN's current LMS) to Canvas and each instructor and course were given individual support by academic technologists in OIT's Academic Technologies group; several College of Education and Human Development (CEHD) courses were supported by academic technologists within their college.

3.2 CANVAS PILOT EXTENSION

Mid-way through the spring 2016 semester, leadership involved in the Canvas pilot and Unizin project work³, submitted a request to Unizin sponsors Provost Karen Hanson, CIO Bernie Gulachek, and University Librarian Wendy Lougee, to extend the Canvas pilot through the end of the spring 2017 semester to formally evaluate and compare Canvas to Moodle.

Justification to extend the pilot:

- The user assessment done for the fall 2015 pilot showed a largely positive reaction to Canvas from pilot participants.
- The University began to use Moodle as its LMS 10 years ago. The LMS market and the needs of students and faculty have evolved significantly since then. To ensure that OIT continues to provide the most effective learning technology tools and deliver an exceptional learning experience for students, it is necessary to reevaluate current LMS and LMS alternatives that may be better meet the needs of the University. This aligns with OIT's mission to support University priorities by providing the best

³ Chris Ament, Sr. Director of Academic Technology and User Services, OIT; John Butler, Associate University Librarian for Data & Technology, Libraries, Donalee Attardo, Interim Associate CIO of Academic Technology; Jeff Lindgren, Assistant Director, Center for Educational Innovation (CEI).

technology solutions available.

- UMN's Unizin efforts, are gaining momentum in the area of learning analytics and will progress more quickly using Unizin's common platform, Canvas, than they would with Moodle.
- The Libraries piloted Unizin's *Engage* product (an eText and digital content platform to enable faculty to organize, deliver, and measure interactions with open and licensed materials) in spring 2016. A second semester in fall 2016 would enable them to pilot *Engage* with a larger set of participants using the Canvas platform.

3.3 SPRING 2016 PILOT

The spring 2016 pilot tripled in size, including 62 instructors and approximately 3,000 students enrolled in 65 courses. The intention was to include a wide distribution of courses, by college, department, and system campus. See Figures 1 and 2 below.

Another goal of the spring 2016 pilot was inclusion of courses that might pose specific challenges, such as those with large enrollments (three courses had enrollments of between 100-400 students) or those that use a variety of third-party integrations, such as the i>clicker audience response system or Turnitin plagiarism checking service.

As in the fall pilot, Instructors' courses were copied from Moodle to Canvas and each instructor and course were given individual support by academic technologists in OIT's Academic Technologies group; CEHD courses were supported by academic technologists in their college. The Duluth and Crookston campus courses also received support from their local IT staff.

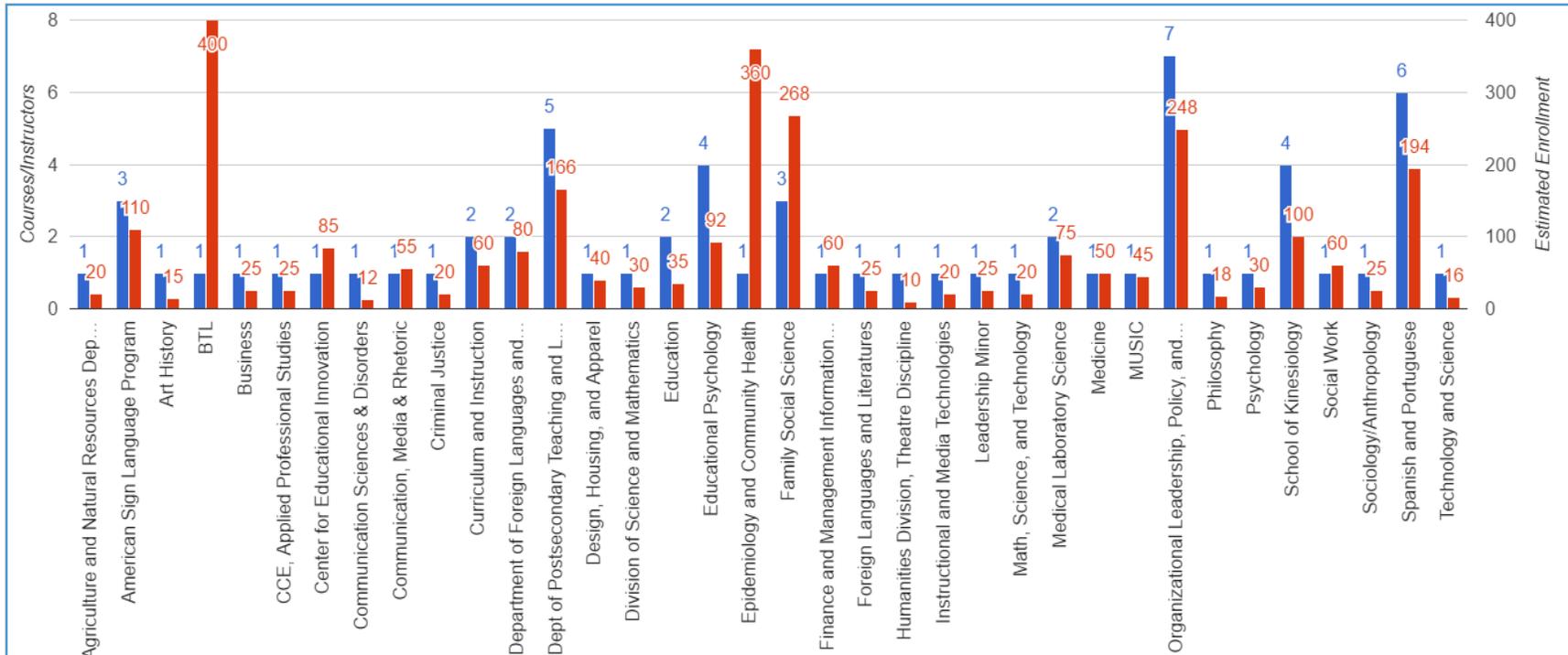


Figure 1 – Total of courses (in blue) and student enrollment (in red) for fall 2015 Canvas pilot

Crookston	5	101
Duluth	9	292
Morris	7	168
Twin Cities	44	2358
Grand Total	65	2919

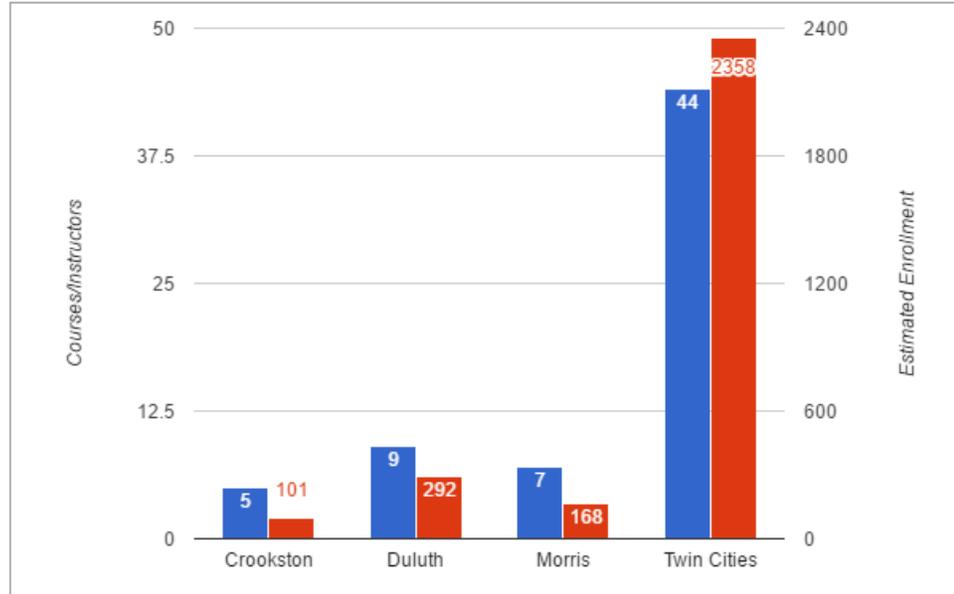


Figure 2 - Courses (in blue) and student enrollment (in red) at each UMN system campus

4 USER ASSESSMENT

The following section summarizes results from the following assessments performed during the first two semesters of the pilot. To see the full text of each report, follow the links below.

- [*Fall 2015 – Instructor and Student Canvas Pilot Evaluation*](#)
- [*Evaluation of the Instructor and Student Experience of the Pilot of the Canvas Learning Management System Spring, 2016*](#)
- [*Summary Report for Canvas Learning Management System Usability Evaluation*](#) (faculty)
- [*Summary Report for Canvas Student Experience Usability Evaluation*](#) (students)

4.1 EVALUATION METHODS

Evaluation data was collected by Paul Baepler, CEI, via survey and focus groups for both faculty and students.

Usability data was gathered in two different sessions by Nick Rosencrans, User Experience Analyst, OIT, using a cross-functional evaluation team. Team members developed realistic task scenarios and observed faculty (in the first study) and students (in the second) to help identify usability issues, which were then analyzed according to impact and difficulty to fix.

(Further details on data collection methods may be found in each report linked above in section 4.)

4.2 FALL 2015 INSTRUCTOR AND STUDENT EVALUATION SUMMARY

4.2.1 Data Collection Rate

	# of Participants	Response Rate
Instructor Survey Responses	25	100% ⁴
Instructor Focus Group Participants	7	
Student Survey Responses	385	43% ⁵
Student Focus Group Participants	9	

4.2.2 LMS Preference

Students' fall 2015 survey responses showed a slight preference for Canvas over Moodle when asked which LMS helps them better succeed in their classes (Figure 3).

⁴ Survey participation was required for faculty to receive a stipend for pilot participation.

⁵ For replying to the survey, students were entered into a raffle to receive a gift card.

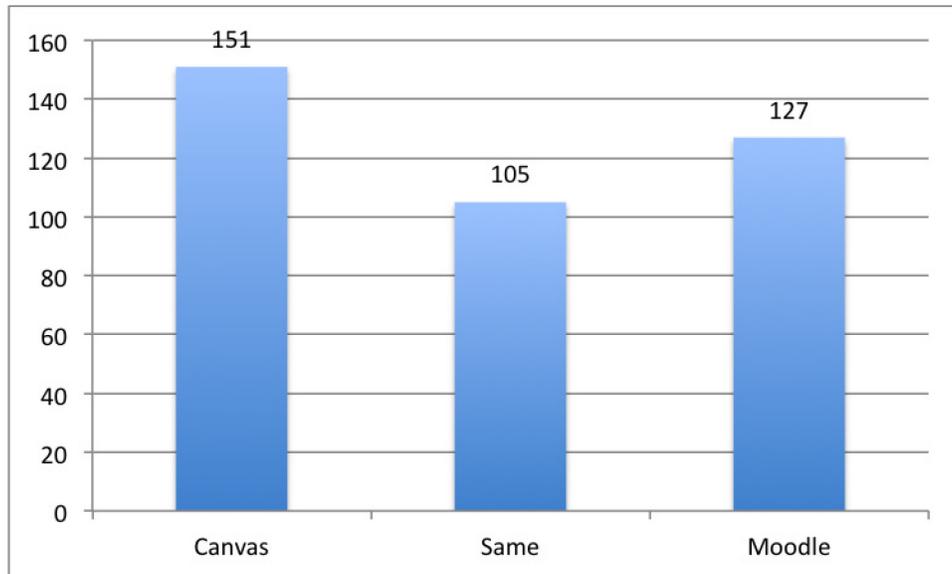


Figure 3 – Fall 2015 Student LMS Preference (credit: Paul Baepler)

Instructors indicated Canvas was better for teaching than Moodle (Figure 4).

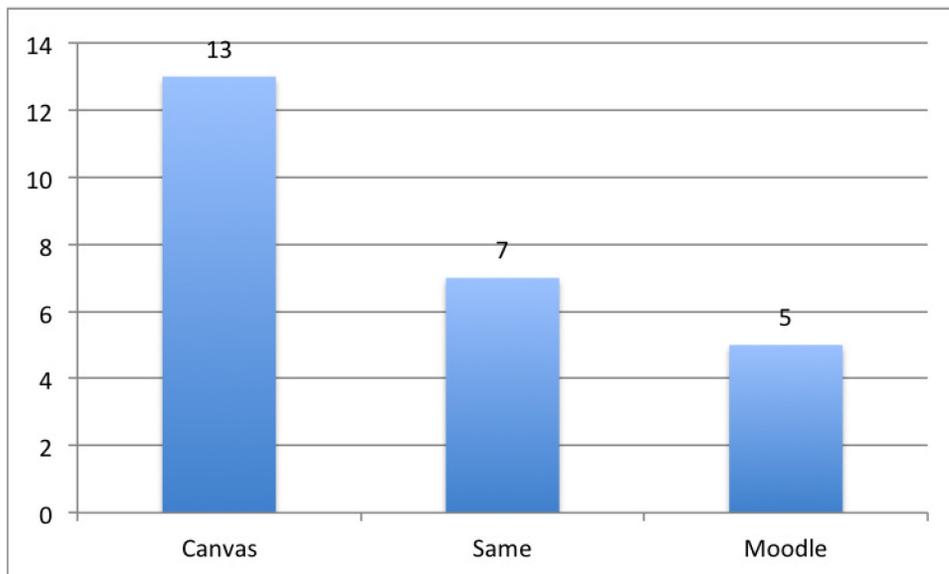


Figure 4 – Fall 2015 Instructor Preference (credit: Paul Baepler)

4.2.3 Faculty Survey Response Summary

The following results emerged from the survey data of faculty:

- Overall, instructors indicated Canvas was better for teaching than Moodle.
- Instructors were satisfied with Canvas, giving “communicating with students” and “creating and administering online tests, quizzes, and/or surveys” the highest scores, while “using third party tools: Turnitin, Kaltura, i>Clickers, etc.” received the lowest score.
- The majority of instructors found Canvas easy to use, and either moderately or highly useful.

4.2.4 Student Survey Response Summary

The following results emerged from the survey data of students:

- Students expressed a slight preference for Canvas over Moodle when asked which LMS helps them better succeed in their classes.
- Students expressing level of satisfaction with Canvas features they had used rated “Tracking assignments and grades on assignments” highest, and “Communicating with other students in the course” lowest.
- Fewer than 20% of students experienced three or more issues with Canvas during the fall semester.
- Students generally found Canvas helpful in performing course tasks.

4.2.5 Faculty Focus Group Summary

Positive themes in the faculty focus group conversation were:

- Most faculty found Canvas to be more “intuitive” to learn than Moodle and received fewer questions from students.
- The interface was described as “clean, uncluttered, and modern.”
- Instructors felt that the ability to respond to students – including grading – was well integrated into the tool, leading to more efficient workflow.
- Canvas encourages a more flexible, modular approach.
- Grading in Canvas is more efficient than Moodle.
- The Calendar tool allows a view that helps instructors see how the course flows.

Negative themes in the faculty focus group conversation were:

- File management could be cumbersome.
- Notifications were “vague.”
- The mobile app didn’t provide easy functionality – it was mostly suitable for viewing only.

4.2.6 Student Focus Group Summary

Positive themes in the student focus group conversation were:

- They liked the “crisp and clean” look; found it to be uncluttered and efficiently organized.
- Canvas was seen as a “collaborative learning space” because of integration with Google docs and an easy-to-use discussion space.
- Estimating grades with descriptive data for each assignment was singled out positively by many.
- Canvas notification system and discussion space was “helpful and intuitive.”
- The speed of the LMS is important.
- It is easy to find what they need.

Negative themes in the student focus group conversation were:

- There were “glitches” supporting quizzing in a large, multi-section course.
- Not all instructors operate Canvas efficiently.

4.3 SPRING 2016 INSTRUCTOR AND STUDENT EVALUATION SUMMARY

4.3.1 Data Collection Rate

Source	# of Participants	Response Rate
Instructor Survey Responses	62	100% ⁶
Instructor Focus Group Participants	14	-
Student Survey Responses	874	37% ⁷
Student Focus Group Participants	5	-

4.3.2 LMS Preference

Both students and instructors were asked which LMS they preferred, and both groups expressed a moderate preference for Canvas over Moodle (Figures 5 and 6).

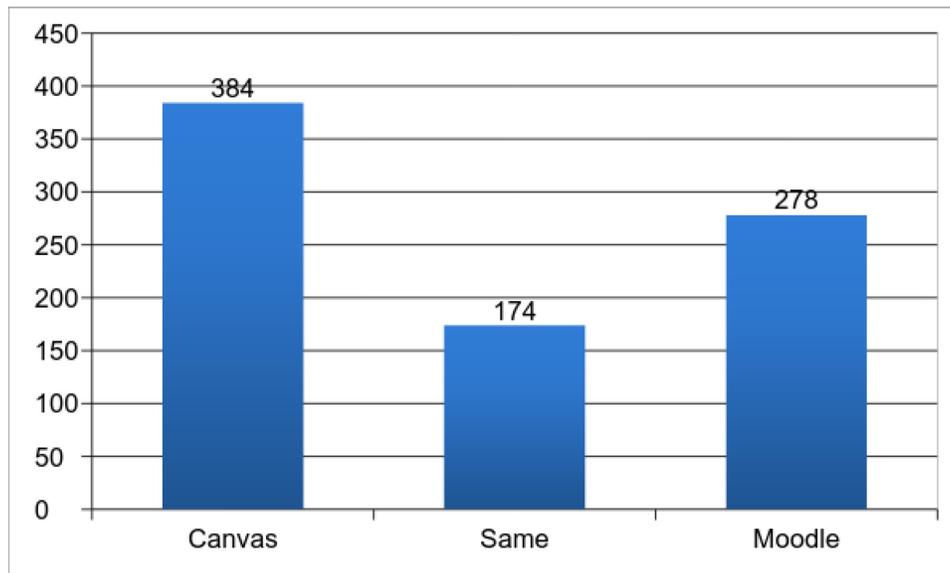


Figure 5 - Spring 2016 Student LMS Preference (credit: Paul Baepler)

⁶ Survey participation was required for faculty to receive a stipend for pilot participation.

⁷ For replying to the survey, students were entered into a raffle to receive a gift card.

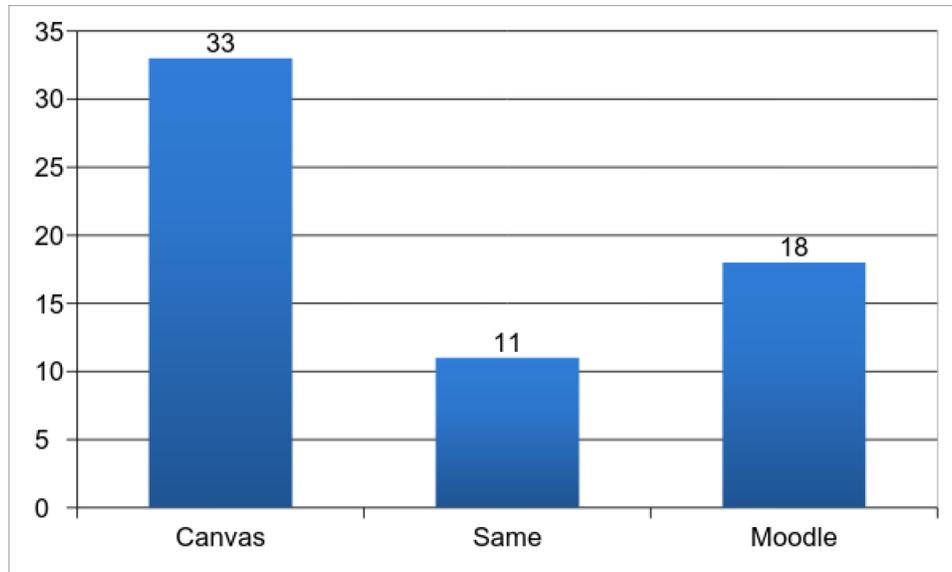


Figure 6 - Spring 2016 Instructor Preference (credit: Paul Baepler)

The following summary (sections 4.3.3 - 4.3.7) is reproduced verbatim from [*Evaluation of the Instructor and Student Experience of the Pilot of The Canvas Learning Management System Spring, 2016*](#) (pp. 3-5).

4.3.3 Key Instructor Findings

- Over 90% of instructors found Canvas either moderately useful or extremely useful. Approximately the same percentage found Canvas easy to learn, saying that they grew comfortable after several weeks or less of using the tool.
- Over 80% of the instructors were either satisfied or very satisfied with all 11 Canvas features polled. The highest ratings were reserved for:
 - Grading assignments and tracking grades
 - Setting up the course
 - Uploading, organizing, and sharing course materials
- When asked for their preference between Moodle and Canvas, 53% of the 62 instructor respondents preferred Canvas, 29% preferred Moodle, and 18% remained neutral.
- Unlike the students who stated they preferred the University support a single LMS (79%), 37% of instructors would like the University to support multiple systems, 32% were neutral, and 31% would choose to support a single LMS.

4.3.4 Key Student Findings

- Like the instructors, 90% of the students felt comfortable with Canvas within several weeks or less of using it.

- Approximately three quarters of the students were either satisfied or very satisfied with the mobile app.
- Students found Canvas particularly useful to:
 - Know what grade they received on an assignment/project
 - Track their overall grade
 - And, complete course assignments
- When asked for their preference between Moodle and Canvas, 46% of 836 student respondents preferred Canvas, 33% preferred Moodle, and 21% remained neutral.

4.3.5 Instructor Focus Group Summary

- Instructors singled out several Canvas features as being beneficial to their teaching, including Speedgrader, calendar, rubrics, integration with mobile and Google Docs.
- Most instructors acknowledged tradeoffs between Canvas and Moodle. Canvas was described as being modern, intuitive, easy to learn, and particularly good for assessment and communication, but it lacked some customization abilities, and some worried that the University would be dependent upon a third party to run the tool and answer inquiries. In contrast, Moodle was described as being customizable, open source, and university-controlled; it was also depicted as seeming out of date, lacking mobile capability, and a challenge to learn in-depth.

KEY QUOTE: *“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 (sic) and drive with ... but it’s the chosen car.”*

- Instructors agreed with students that they initially found “tunneling” into Canvas pages a challenge and sometimes had to inefficiently return to the homepage to reorient themselves to the course content. Students and Instructors both agreed that the “nesting”, or indentation levels, in forums was difficult to fathom at times.
- Instructors praised Speedgrader, rubrics, and instructor-student communication abilities with few reservations.

4.3.6 Student Focus Group Summary

- Students appreciated features that helped them to organize their academics: “to do” lists, calendar feature, and some of the notifications. They also liked the feature that allows them to model and predict their grade (the “What If” function).
- Students liked the seeming simplicity of Canvas and the clean-looking interface.
- Students are keenly aware that the function of the LMS is largely dependent upon the instructor’s ability to use the tool well.

KEY QUOTE: *“Everything depends on the instructor.”*

- Similar to instructor opinion, students found the navigation to be sometimes confusing.

4.3.7 Pedagogical Observations

The following are participant anecdotes related to teaching and learning.

- Students felt their Canvas forum comments were more likely to be read because they could be more easily and efficiently accessed by other students.
- Students perceived that they received more prompt feedback within Canvas because instructors were already focusing on grading their work from within the tool.
- An Instructor felt the rubric tool allowed her to give more feedback, to do it consistently, and to be more transparent about her grading.
- Canvas allowed an instructor to send a reminder to *only students who had not yet completed an assignment* in order to encourage them to complete the work.
- Instructors appreciated that they could comment on different file types from within the tool, including .docs, .jpgs, .pdfs and return different media types of feedback.
- Because of its responsive design, instructors found that it was difficult to project pages from Canvas in a classroom setting.

Additional teaching and learning anecdotes from the previous semester (Fall, 2015):

- An Instructor mentioned that because grading was more efficient with less clicking, he spent more time grading and gave more substantive feedback.
- An Instructor used a rubric for the first time because it was easier to use in Canvas.
- An Instructor more willing to hold an online discussion in Canvas because otherwise was dreading the grading.
- Students felt that because the Canvas technology was simple and reliable that they could concentrate more on the content than the mechanics of completing an assignment.
- Students pointed out that knowing what their grade might be helped them to determine if they needed to try harder.
- Student mentioned that in the past, due to long response times, they lost confidence that their work would upload in Moodle. They sometimes turned in incomplete work just to get something submitted.
- Many students commented on the need for instructors to have proper training in any LMS.

4.4 USABILITY EVALUATIONS

During the pilot, usability evaluations of Canvas have been conducted for the faculty experience and for the student experience.

4.4.1 Faculty Usability Study

On October 13-14, 2015, a [usability study](#) was conducted through Usability Services in OIT, led by User Experience Analyst Nick Rosencrans. Goals of the study were:

- To identify issues that prevent users from completing their own tasks without outside help
- To explore what makes Canvas distinctive compared to other learning management systems
- To consider what specific features may be easily translated into the existing Moodle environment
- To decide upon changes to make to the spring pilot
- To assist with the development of the final report on the Canvas pilot

The usability team identified key issues that were referred either to the Canvas pilot project team or to Instructure for consideration. These are found on p. 6 of the [Usability Evaluation Summary Report](#).

After participating in the usability study, participants were asked to select five words from a sheet of adjectives, a Desirability Matrix, describing Canvas based on their experience with it during the usability evaluation. The following were chosen most frequently among participants:

- Clean (4)
- Organized (4)
- Effective (3)
- Complicated (3)

Participants were also asked to rate Canvas on a System Usability Scale (SUS).⁸ Canvas received an average SUS of 61.

4.4.2 Student Usability Study

On March 7, 2016, a [usability study](#) was conducted through Usability Services in OIT, led by User Experience Analyst Nick Rosencrans. Goals of the study were:

- To explore what students encounter when first introduced to an unfamiliar learning management system
- To identify aspects of Canvas that lead students to feel confused, frustrated, or engaged
- To pinpoint which features of Canvas inhibit efficiency and familiarity of the course design, and could be hidden from view

⁸ The [SYSTEM USABILITY SCALE \(SUS\)](#) is the most widely used standard questionnaire for measuring the perception of usability. First developed in 1986, it has been used on software, websites, mobile phones, hardware, interactive voice response (IVR) systems and even paper ballots. It has been cited in over 600 research publications and is part of leading commercial usability-evaluation tools" ([Usability Evaluation Summary Report](#), p. 7). While interpretation of the SUS depends on many factors, the average SUS score is 68.

The usability team identified key issues that were referred either to the Canvas pilot project team or to Instructure for consideration. These are found on p. 6-7 of the [Usability Evaluation Summary Report](#).

After participating in the usability study, participants were asked to rate Canvas on a System Usability Scale (SUS). Canvas received an average SUS of 76.

5 TECHNICAL ISSUES AND CONSIDERATIONS

What follows is a summary of a detailed technical evaluation of Canvas. The full technical evaluation is also available: [Canvas Technical Evaluation](#)

5.1 ARCHITECTURE

ENTERPRISE ARCHITECTURE – THE CANVAS CLUSTER

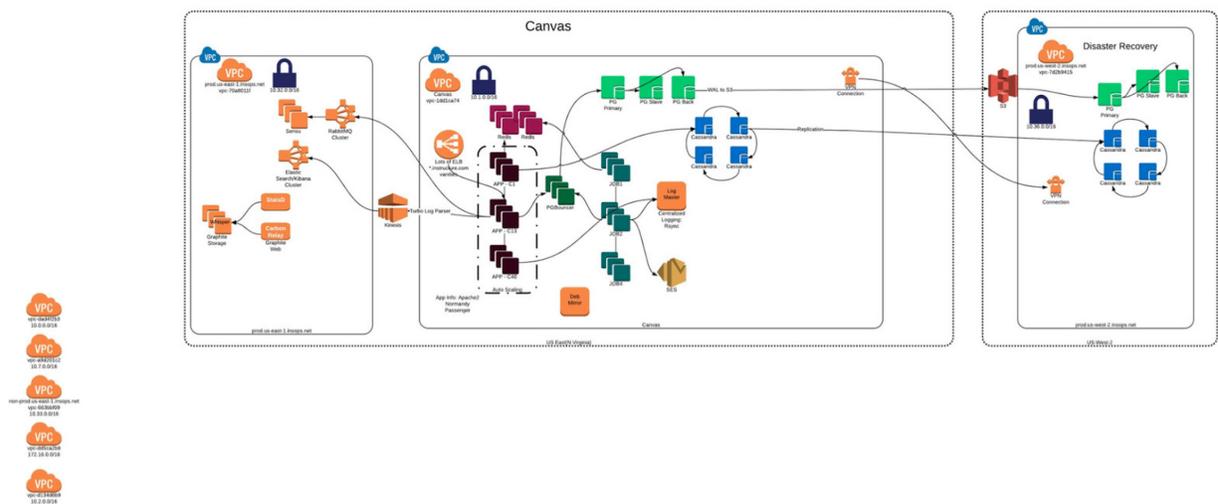


Figure 7 - source: Instructure Presentation 2/5/2016 at UMN

Instructure provides a cloud-based, hosted solution for a learning management system through Amazon Web Services. As indicated in the above diagram, this includes load balancing, elastic scaling, and disaster recovery around their primary service offering, Canvas. The web application framework upon which Canvas is built is Ruby on Rails, with a responsive HTML5/CSS3/jQuery-based user interface and a PostgreSQL-backed data architecture. The Canvas system offers a Production instance with live courses and data, a Test instance for troubleshooting bugs and user issues, and Beta instance, where releases live for three weeks of testing before being released to Production.

In addition to Instructure’s core LMS offering, the Canvas application ecosystem incorporates a suite of optional integrated systems that extend the LMS’s core functionality, including a learning content management system (Commons), an electronic portfolio system (ePortfolio), and a learning analytics datastore with associated APIs (Canvas Data), among others. See section 5.7.2 for more on Canvas APIs.

In contrast with the side-by-side upgrade process currently employed with the University's Moodle offering, Instructure employs an upgrade-in-place strategy. Instructure's approach offers some long-term advantages over a side-by-side process – namely, users retain stable identities within the system, and courses can remain active and accessible in a common production environment for as long as the owning instructor or program requires.

Canvas's provides new releases – some with larger changes, some smaller - every three weeks. The University cannot control when these releases are made, though the timing of implementing larger releases that may affect user experiences may be controlled by University administrators. Lack of a QA ("Quality Assurance") Canvas instance for adequately testing such releases is problematic; A QA environment is considered a good administrative/technical practice as it avoids situations where testing in production affects system users.

5.2 RELIABILITY

Overall, Canvas availability and performance has been good during the pilot period. Although a number of outages and periods of degraded performance were recorded during the pilot period (including several with durations of greater than 60 minutes during peak usage periods), few of these incidents led to support tickets and overall uptime exceeded 99.5%.

5.2.1 Canvas Outages

Instructure recorded a total of 622 minutes of outages, related to 11 incidents between 01 September 2015 and 27 May 2016. Uptime is approximately 99.8% .

5.2.2 Incidents of Slowness

Instructure recorded a total of 1,171 minutes of slowness, related to 24 incidents occurring between 01 September 2015 and 27 May 2016. Undegraded performance time is approximately 99.7.

As an overall index of reliability, Canvas's time without an outage or incident of performance degradation during the pilot period is 99.539%.

5.3 FUNCTIONALITY AND USABILITY

The functionality and usability of Canvas was evaluated by comparing the tools it offers to those that are needed and expected in an enterprise learning management system, namely:

- Course and System Administration tools
- Assignments
- Surveys, Polls, and Quizzes
- Communications and User Engagement tools
- Collaborations and Group work tools
- Learning Content-Development and Content-Engagement Tools

Canvas met or exceeded virtually all of the requirements outlined by the technical evaluation team. The sections below, we will summarize Canvas's functionality in each of the six described functional areas as

well as any usability issues that arose related to these functions during the first year of the University of Minnesota pilot.⁹

Canvas met or exceeded virtually all of the requirements for the functional areas defined by the technical team. The sections below will provide additional details on Canvas's functionality in each of the six described functional areas.¹⁰

5.3.1 Course and System Administration Tools

Instructure's Course and System Administration toolset addressed all of the described requirements, providing full functionality for user management (including program interfaces for integrating with external student information and learning-management systems), account, role, and site provisioning, attendance management (including a gradebook integration), activity and course completion tracking; and outcomes definition and monitoring.

The particular strengths of Canvas in this area included:

- *Calendar* and *Syllabus* tools, which are fully integrated with the Assignment- and Module-building tools;
- *Speed Grader* function, which enables instructors and teaching assistants to view and grade all student assignment submissions in a single interface. This feature proved particularly popular with all instructors, particularly those with large courses; and
- *Outcomes management* functionality, which enables individual faculty members and program managers to develop competency definitions, align course assessment items with those competencies, and generate mastery reports for students, courses, and entire cohorts.

The only administrative functionality Canvas lacks that is currently available in Moodle is the ability to award certificates based on activity- or course-completion (Instructure does offer this functionality in an add-on product called Catalog), and a tool for enabling students to visualize their progress in relation to defined course-completion milestones.

5.3.2 Assignments

Assignments functionality in Canvas meets requirements and compares favorably with equivalent functionality in Moodle. The assignments toolset proved robust in pilot testing and no significant usability issues were reported in connection with this activity type.

5.3.3 Surveys, Polls, and Quizzes

Survey, Polls, and Quizzes functionality in Canvas meets requirements and aligns well with similar functionality in Moodle.

Strengths of this functionality in Canvas include: robust question and instrument analytics available in the Canvas interface—which received positive comments from faculty members in post-pilot faculty groups—and Instructure's adherence to the Question and Test Interoperability (QTI) specification in the

⁹ For full definitions and examples of each of these functional requirement areas, see the [Canvas Technical Evaluation](#), section 3.

¹⁰ Significant usability issues experienced during the pilot will be drawn out in this report; otherwise, see section 3 of the [Canvas Technical Evaluation](#) for full details and impact of these issues.

design of its tools. QTI eases bulk import of question banks and instruments from other standards-compliant sources (e.g., publisher content) and any possible future transition from Canvas into another learning management system.¹¹

5.3.4 Communications and User Engagement

Communications and User Engagement functionality in Canvas meets all of the requirements outlined above and compares favorably with equivalent functionality in Moodle.

Other than the Chat tool, the Communications toolset proved robust in pilot testing and no significant usability issues were reported in connection with this activity type.

5.3.5 Collaborations and Groupwork

Collaborations and Groupwork functionality in Canvas meets all requirements and exceeds comparable functionality currently available in Moodle, including a native video conferencing tool (Conferences) that could support online office hours or synchronous working group interactions, and a collaborative document-creation tool (Collaborations) that integrates with Google Docs for the purposes of group authorship.

One tool currently available in Moodle that does *not* have a direct equivalent in Canvas is the Database tool, a system enabling instructors to generate a wizard that facilitates student contribution of structured information and/or media to a shared course content resource.

It is unclear whether the need addressed by this function is for structured data entry (i.e., the ability to prompt users for specific information in the course of content-creation) or simply the ability to generate a shared student-created/student-curated file resource; if the latter, then Canvas Commons could address that need.

5.3.6 Learning Content-Development and Content-Engagement Tools

Canvas meets requirements for Learning Content-Development and Content-Engagement Tools, supporting file-sharing, rich content-development, and external tools subsystems.

In comparison with Moodle, Canvas lacks several rich content-development tools that have seen moderate usage across the last two instances of Moodle, namely:

- Book: Canvas's Modules tool doesn't offer all of the navigational functionality of Moodle's Book,
- Glossary: centralized definition of course terms that can automatically identify those terms in context and link to the Glossary definition, and
- Lesson: branching narrative and embedded assessment builder.

¹¹ A significant upgrade to Canvas's quiz functionality is scheduled to deploy in summer 2016, so additional analysis of this functionality is recommended in connection with the 2016–2017 Canvas pilot extension.

Canvas’s support for integrated SCORM¹² content packages is also less robust than comparable functionality in Moodle.¹³

Canvas’s file-management functionality has proved superior to Moodle’s from a usability perspective and, unlike Moodle, Canvas’s integrated repository (Commons) and electronic portfolio (ePortfolios) systems facilitate the sharing of content—either privately across multiple course sites, among a defined group of colleagues, or publicly. It also provides efficient management of content within and across courses, programs, and institutions.

5.3.7 Accessibility

To minimize issues with accessibility, Canvas was developed using modern HTML and CSS technologies. Instructure is committed to W3C's Web Accessibility Initiative and [Section 508](#) guidelines.

Instructure also provides a [Canvas VPAT](#) (Voluntary Accessibility Template) as a tool decision-makers may use to evaluate Canvas' conformance with the accessibility standards under [Section 508 of the Rehabilitation Act](#) and the Act WCAG 2.0 AA Standards.¹⁴

According to Instructure, they ensure that all new features are accessible prior to deployment to production environments. In addition, their Accessibility Team regularly retains independent accessibility firms and collaborates with end users to review and continuously improve Canvas. Their internal processes, external audits and the collaborative feedback from our all combine to help meet their commitments to accessibility.

Also of note:

“WebAIM.org, a third party authority in web accessibility, has [evaluated the Canvas Learning Management System](#) (LMS) by Instructure and certifies it to be substantially conformant with Level A and Level AA of the Web Content Accessibility Guidelines version 2.0. A representative sample of system views was evaluated for accessibility. This sample included course pages, calendars, quizzes, and communication tools.”¹⁵

5.4 FEATURE COMPARISON

The Canvas pilot project team created a [table](#) comparing tools and features of Canvas and Moodle. Please note: this table is only an “outline” of the tools and features available in each, and awaits fleshing out for the fall 2016 final report.

Highlights so far:

¹² [SCORM](#) stands for “Shareable Content Object Reference Model”. It is an industry standard used by developers so that their programs can interact successfully with other e-learning applications. An example of how it might be used: creation of a presentation with software that allows you to embed quizzes. When uploaded to an LMS as SCORM and the quiz is taken by a student, it automatically takes the score from that embedded quiz and enters it as a score into the LMS grade book.

¹³ See section 4 of the [Canvas Technical Evaluation](#) for an in-depth discussion of SCORM usability issues encountered by one pilot instructor.

¹⁴ <https://community.canvaslms.com/docs/DOC-2061>

¹⁵ <https://community.canvaslms.com/docs/DOC-2061>

Generalizing, there are more customization options in Moodle, but the tools and functions available in each are much the same.

Exceptions of note are:

	Canvas	Moodle
Lesson and Book tools		X
SpeedGrader tool	X	
Grading functionality in the mobile application	X	
Detailed activity and course completion tracking		X

5.5 SUPPORT FOR INTEGRATED SYSTEMS AND LEARNING TOOLS INTEROPERABILITY (LTI) STANDARDS

Canvas’s learning platform is purposefully designed as a core of critical course-management functions that can be augmented as needed by administrators and instructors with optional tools and functionality. This enables an institution to customize the LMS to address campus-wide needs, or an individual instructor to extend her or his class by adding external tools to a course site using Instructure’s integrated app store-like [EduAppCenter](#).

5.5.1 Integrated Systems

For the 2015-16 pilot, the University of Minnesota pilot team implemented the following systems to integrate with Canvas:

- **Box:** the Canvas pilot team opted to employ Canvas’s default solution for file storage—Box—owing to the range of integration options Box offers with other learning technologies, as well as its support for document previewing, rendering, and annotating functionality.
- **Canvas Commons:** learning object repository, activated to the sharing of Canvas activities, modules, and courses within and across teams in the University system, and also to allow those instructors who wished to do so to share their courses and materials with the larger Canvas user community.
- **Canvas Data Portal:** Canvas continuously captures and aggregates data about the learning management environment and learner behaviors therein.
- **Chat Room:** optional add-on tool that enables synchronous group discussion.
- **Google Drive:** enables instructors and students to co-author content using Canvas’s Collaborations tool and/or to search for/attach content from their Google Docs accounts as assignment submissions.¹⁶
- **Kaltura Media Gallery and My Media:** two Kaltura tools are available in each course site’s left-navigation panel: Media Gallery, a repository of course-related media files available to all

¹⁶ Use of the Google Drive integration requires instructors and students to register their Drive accounts in their Canvas profile settings (a simple task that involves users agreeing to the integration’s terms of use and clicking a button to generate an access token). In usability tests with students, this procedure proved unproblematic.

participants in the associated Canvas course site, and My Media, a private repository of each user's Kaltura media recordings.

- **Roll Call Attendance Tracker:** enables instructors to create custom seating charts and/or to take attendance electronically. Participant attendance can be graded as an assignment, and can be used as a trigger for the award of badges, etc.
- **SCORM:** enables instructors and designers to import SCORM-compliant ZIP packages into a Canvas course site and integrate those interactive content activities into classes as graded or ungraded assignments (via the Assignment tool).¹⁷

5.5.2 LTI-Based External Tools Integrations

In addition to the core system integrations described above, Canvas enables institutions to integrate with other applications using the “IMS learning tools interoperability” (LTI) standard.¹⁸

Based on instructor and instructional designer requests, during the 2015–2016 pilot period the University of Minnesota technical team integrated the following systems:

Badgr: a badging solution offered by Concentric Sky. It provides manual and completion-based badge issuance, support for longitudinal reporting on badge completions, and aggregation and curation of badge collections by students.

i>Clicker: at the request of several pilot instructors, the technical support team integrated those faculty members' preferred student response system, i>Clicker.

Although there were some initial technical difficulties with the i>Clicker implementation (primarily related to system load during initial registration of students' remotes and browser compatibility issues), the greatest challenge with i>Clicker related to course design and was caused by i>clicker limitations.¹⁹

Publisher Integrations: several pilot instructors requested integration with publisher-supplied textbook packages. In each of these instances, members of the pilot support team worked directly with representatives of the publishing companies to configure and test the McGraw-Hill Campus and Pearson MyLab (Spanish) packages. According to instructor reports, these integrations performed as expected and—in the case of the MyLab Spanish package—afforded the instructors functionality that they currently lack in Moodle.

¹⁷ See pp. 13-14 of the [Canvas Technical Evaluation](#) for a detailed description of the SCORM experiences of one instructor during the pilot. The UMN technical team will explore SCORM in greater depth in the 2016–2017 pilot to determine whether the issues that arose in the first year were due to Canvas's SCORM tool itself or whether the tool's limitations were interacting with problems in integrated content packages.

¹⁸ More information about LTI integrations: <https://www.imsglobal.org/activity/learning-tools-interoperability>

¹⁹ The i>Clicker base station can only sync one-to-one with a Canvas course site. Since the two largest pilot course sites included multiple lecture sections in a single Canvas course and (1) multiple sections met simultaneously or (2) all of the course sections met at different time, the consultant supporting the course had to invest significant time and effort to generate Canvas course configurations and classroom workflows that accommodated instructors' needs while adhering to the limitations imposed by the i>Clicker system itself.

Respondus LockDown Browser: several instructors required an examination security solution capable of supporting large enrollment courses; the pilot support team elected to integrate Respondus LockDown Browser via LTI.

Students in large enrollment courses have taken exams requiring Respondus LDB in both wireless (Fall 2015) and wired (Spring 2016) settings and we have received no reports of problems either from student test-takers or from their instructors with regard to functionality or responsiveness.

Turnitin LTI: a plagiarism-checking service already integrated into Moodle, the Canvas LTI integration of Turnitin is less satisfactory. Instructors reported that it provides less information than a previously-available version provided.

VoiceThread: an “interactive collaboration and sharing tool that enables users to add images, documents, and videos, and to which other users can add voice, text, audio file, or video comments.”²⁰ The VoiceThread integration has proved reliable and easy for users to master.

Yellowdig: a social collaboration board for pinning and discussing course-related content. Although the integration proved comparatively simple to implement and support, the consensus of opinion among both Canvas and Moodle users of the product is that it didn’t provide significant advantages over comparable functionality in either learning management system’s course forum tool.

The Carlson School of Management (the organization that had been providing umbrella access to all UMN users) will not be renewing their license, so Yellowdig will be removed from the Canvas whitelist following the recording of Spring 2016 semester grades.

YouTube: the Canvas YouTube integration added a YouTube icon to Canvas’s Rich Text Editor, enabling users to search for publicly accessible YouTube recordings and seamlessly embed them in all course content and activity types.

5.6 INTEGRATION INCIDENTS

Over the year pilot, University of Minnesota users opened a total of six integration-related tickets with the Canvas helpline. Two of the submitted tickets related to minor or localized issues with external tools integrations that only affected a single course or didn’t produce a deep or last loss of functionality.

More significant and persistent problems have affected two further external tools integrations, Canvas’s SCORM (sharable content object reference model) solution and their connection with the i>Clicker student response system.

Overall, the complexity and severity of these latter issues highlight a support challenge that could become significant if the University were to transition to Canvas.

Canvas depends on external tools integrations to afford instructors and students with access to a richer pool of learning resources and activities than can be supported in the core application; however, integration with such external systems will inevitably lead to a certain degree of friction as those

²⁰ <https://www.njea.org/news-and-publications/njea-review/march-2011/voicethread>

systems interact with Canvas itself, with students' and instructors' Web platforms, and with users' workflows and usage habits.

In other words, most issues were not Canvas problems per se, but they highlight some of the support issues that would likely arise were we to transition to a system with a greater degree of external tools integration than currently employed in Moodle.

5.7 SUPPORT FOR CRITICAL INTEGRATIONS

The following section discusses Canvas's integrations with UMN central systems.

5.7.1 Authentication

Authentication for those logging in to Canvas uses UMN's Shibboleth service over Security Assertion Markup Language (SAML). UMN was added to Instructure InCommon federator on 19 May 2016, which provides additional fields of data.

During the pilot period, Instructure reported one outage related to Canvas's SAML consumer, which prevented users from logging-in to the LMS via Shibboleth. University of Minnesota users submitted one support ticket in response to this 01 March 2016 incident.

5.7.2 API

APIs allow developers to customize the LMS by developing add-on functionality to respond to the institution's special needs. *API* is an acronym for Application Programming Interface. An API is a "set of routines, protocols, and tools for building web-enabled and mobile-based applications."²¹

Canvas provides a REST API for programmatically interacting with the system, allowing for the creation of custom workflows, plugins, and functionality. For an administrator, the API allows for the programmed creation of courses/sections, creation and enrollment of users, and similar actions.

5.7.3 SIS Import for Enrollment

The import process for enrollment information has undergone several changes in response to issues noticed over time. SIS (Student Information System) import for approximately 3,000 students, 4,000 enrollments takes 5-10mins for Canvas to process in full.

5.8 MIGRATION OF MOODLE COURSES

Instructure provides a converter that facilitates the import of Moodle content and activities into a Canvas course site. As a result, migration of Moodle courses to Canvas proved efficient and relatively problem-free, requiring only that instructors or course designers re-organize and contextualize the imported course content.

The primary issue encountered with migration affected courses with large and complex quiz question banks. Hierarchized question banks and some question assets (e.g., embedded images, audiovisual recordings, etc.) do not cleanly upload. In those instances, the pilot support team used Respondus's Quiz-Builder functionality to move Moodle question banks to Canvas.

²¹ <https://www.marketingtechblog.com/what-does-rest-stand-for-example-rest-api/>

5.9 INSTRUCTURE ADMINISTRATIVE AND USER SUPPORT

5.9.1 Support Ticket Analysis

From 14 August 2015 through 27 May 2016, University of Minnesota users initiated a total of 123 help requests with Instructure via chat, telephone, and webform. Pilot support team members have analyzed those tickets and categorized them as follows:

- 24 User Error
- 34 Course Design Issues
- 6 Integration Problems
- 31 Canvas Bug (8 of these tickets related to a single problem)
- 6 Enhancement Request
- 17 Information Request
- 5 Non-Canvas Technical Problem

Most reported issues were either transient or affected only a single user or (if a design issue) a single course.

Instructure has typically picked up all requests and addressed users' questions in a timely manner; follow-up customer satisfaction survey scores (CSAT²²) have ranged from 93–96%, with a monthly average rating of 94.42%.

Instructure support agents and engineering staff members typically identified the source of an issue and (when possible) proposed a workaround within 24 hours; when a workaround was impractical or a problem was identified in code, a fix was typically deployed by Instructure within one three-week development cycle of the first report of an incident.

5.9.2 Support Outages

Instructure reported four user support outages during the pilot period, one related to the support desk's chat tool, two related to their Salesforce Service Cloud ticketing system, and one general issue related to Salesforce authentication. Each incident was comparatively brief and none generated 1-HELP traffic or direct reports from UMN participants.

5.10 ANALYTICS AND REPORTING

Canvas offers a variety of analytics and reporting functionality through its interface and APIs. The graph below describes the three available types: student-facing, instructor-facing, and administrator/researcher-facing.

A full description of these is in section 8 of the [Canvas Technical Report](#).

²²[Customer Satisfaction Score](#)

Data & Analytics in Canvas		
Student-Facing	Instructor-Facing	Administrator-Facing
<ul style="list-style-type: none"> • Very minimal; only grades page with “what if” analysis 	<ul style="list-style-type: none"> • Course statistics <ul style="list-style-type: none"> ○ Usage/count data • Course analytics <ul style="list-style-type: none"> ○ Activity by date ○ Submissions ○ Grade distribution ○ Student analysis • Student access and usage analytics • Quiz statistics 	<ul style="list-style-type: none"> • Instance analytics • In-app, 5-day Caliper-compliant data store <ul style="list-style-type: none"> ○ Reports generated daily • API

6 PREPARATION FOR PILOT FINAL PHASE - FALL 2016

6.1 TRANSITION TO FORMAL REVIEW

Because the pilot has transitioned into a formal review and comparison with the Moodle LMS, additions for the final phase of the pilot and evaluation process in fall 2016:

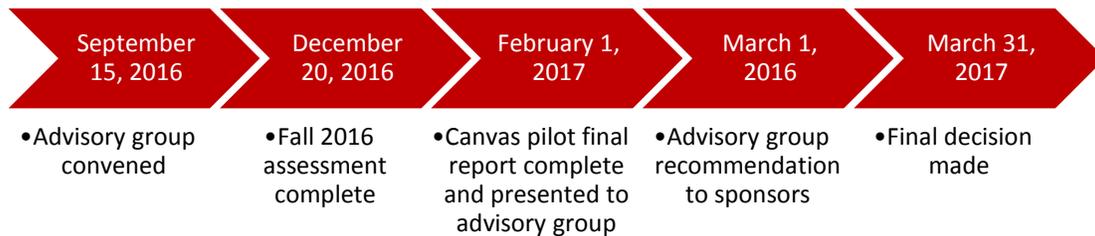
1. The Canvas pilot will be overseen by an advisory board composed primarily of faculty from all colleges and system campuses. It will provide input and advice to the Canvas project team, and ultimately provide a recommendation to Canvas pilot sponsors based on the Canvas project team’s final report.
2. Evaluation will be broadened and data from both LMS’s mined to provide the most fair and comprehensive picture. This includes:
 - a. The administrative team will undertake more focused comparisons of equivalent functions in Moodle and Canvas; both a side-by-side analysis of the functionality and usability of the competing technical systems and focus group interactions with instructors and students regarding the usability of those functions.
 - b. The project team is brainstorming with the Academic Technology Tools team regarding any additional data that will be needed for the pilot’s final phase, with a focus on data from Moodle.

3. In an effort to involve as many as possible in this important decision, a communications campaign will be launched to educate the community on how they can participate and get more information.

6.2 TIMELINE FOR LMS DECISION

UMN’s license agreement with Instructure provides for the pilot to run through the spring semester, but due to timing, assessment will complete with the end of the fall 2016 semester. The spring semester will provide time for the evaluation data to be gathered and reported.

The tentative timeline below will be the project team’s goal.



7 CANVAS PILOT PROJECT TEAM

The 2015-2016 Canvas pilot project team was composed of the following individuals:

- | | |
|------------------------|-----------------------|
| Alex Anderson | Kara Hanson |
| Annette McNamara | Kristin Riker-Coleman |
| Amanda Evans | Drew LaChapelle |
| Paul Baepler | Lauren Marsh |
| Keith Brown | Mark McKay |
| Donalee Attardo | Qi Zhang |
| Erik Epp | Sara Schoen |
| Emily Stull Richardson | Chris Scruton |
| Jennifer Englund | Susan Tade |
| Melissa Falldin | Jeff Weber |
| John Bothe | Kim Wilcox |
| | Yelena Yan |