

# Quercus Instructor-Facing Dashboard

## Phase 1 - 2021/22

### Overview

The goal of this initiative was to gather information on strategies to better support instructor and staff access to learning analytic data, with a focus on planning improvements to Quercus core reporting functionality to enhance instructional quality and evidence-based planning. The Quercus Instructor-Facing Dashboard - Phase 1 aligns with green paper recommendations:

- 4.1 Support for instructor and staff access to learning analytic data and dashboards to improve learning materials, tools and strategies.

In this phase we have begun planning for the first of what may be a series of data visualizations or tools within a “dashboard” model that instructors could use to inform course design and teaching practices. Based on experience with instructor cohorts and user table discussion, four example personas who will utilize the learning analytics dashboard can be viewed in Appendix 1. The initial focus has confirmed priority functions building on prior work with Data-Driven Design program user stories, in combination with requirements prioritized by the LA User Table and other sources. In addition to gathering input from our own community, we have drawn on the work and experiences of peer institutions using Canvas and/or third-party service providers for viable options to build, adapt or purchase services.

Following several months of work with the newly formed Learning Analytics project team, we are in a much stronger position to advance Phase 1 dashboard prototyping given the rapid development of a Quercus Record Store infrastructure. In the process of distilling out instructor dashboard requirement priorities we have collected report and visualization ideas from other organizations for potential adaptation within our own environment. During our explorations we did not identify third party learning analytic dashboard services that meet our current scope of project and/or have potential to improve efficiency and sustainability with regard to project implementation.

### Project activities

- **Confirmation of priority functions to support instructors as primary user group**
  - Summarized data on desired functions for course data access already collected through D3:QA user stories
  - Engaged LA User Table, as well as other key stake holders including Academic Toolbox Reference Group for further input
  - Facilitated functional user group process to formulate user stories and document requirements
- **Environmental scan of viable options to build, adapt or purchase services**
  - Identified dashboard options from green paper, online examples and peers.
  - Extended environmental scan through networking, demo requests, research into peer activities (Educause, Bay View Alliance, UofT networks, Gartner, vendors)
  - Consulted with ACT on infrastructure options/requirements/timelines
  - Consulted with IRDG on governance process

The results of the Quercus Instructor-Facing Dashboard are summarized in two corresponding sections below:

1. **Recommended Functional Requirements**
2. **Implementation Strategies**

This report concludes with recommended next steps for consideration by the LA Project team.

## 1. Recommended Functional Requirements

Over fifty user stories were collected from the following sources:

- Data-Driven Design: Quercus Analytics (D3:QA) cohort of instructors
- Learning Analytics User-Table
- Academic Toolbox Reference Group

The results were themed with the following four areas of exploration emerging, ranked below by those with the greater number of user stories:

- **Student Activity / Progression** – Ability to track the type of activity throughout the term (e.g., # of clicks by day & by resource).
- **Student Assessment** – Relationship between activity and course performance (e.g., average # of visits by week and course mark).
- **Discussion Board Activity** – Exploration of key themes and social network analyses (e.g., groupings by # of interactions and interaction length).
- **Curriculum Mapping** – Ability to see how course-level learning outcomes are achieved through student activity and how achievement maps onto program-level learning outcomes.

We engaged the User Table during two additional meetings with a goal of refining the user acceptance/functional requirements for the **Student Activity / Progression** area of exploration, which included the following user stories:

### **User Story 1: Student Activity**

As an instructor, I would like to have access to a more robust view of student interaction with the course content. For example, I would like more detailed information on number of page or content item views, discussion forum posts and reads, and quiz completions, potentially combined with information regarding the timing of access and other filter options. This will help with informing and improving course design and delivery by providing a detailed picture of student activity.

### **User Story 2: Sequential Progression**

As an instructor, I would like to see students' sequential progress in relation to the course schedule (which is designed/divided by topics) and see where and when the most interactions happen with regards to the specific topics and time periods throughout the semester. In addition to chronological data, I would like to be able to filter by time period, or selected combinations of content and assessment activities. This will provide me with

information on the patterns of engagement with the course materials in relation to assessment activities.

**User Story 3: Overarching Course View**

As an instructor I would like a visual report of the “type” of activity that makes up the course design overall (i.e. content presentation, discussion, formative assessments, group work) in a visual format with filtering capability. Some categorization of content types may be needed. This will allow comparison over time or with other courses as design evolves to meet student needs.

Following the second LA User Table meeting, based on consultation with other members of the Learning Analytics project group, the consensus was that **User Story 1: Student Activity** should be prioritized as the initial focus for prototyping activities. The factors considered include ease of navigation of governance, Quercus learning data availability, and level of complexity for the development of the necessary data extraction and data reporting tools to access data from the new Quercus Data Store infrastructure. Our goal is to identify a discrete project that can be executed in a short time frame for an early win.

Based on input focusing on User Story 1: Student Activity at the third meeting of the LA User Table, the following general recommendations were surfaced for the project implementation phase:

- Present a high level aggregated/grouped level with option to expand to more detail information if necessary.
- Provide option to download data from instructor’s own course (ie data for which access is already available)
- Reduce the amount of work that the instructor has to do when looking at the dashboard (e.g., math, percentages, select dates)
- Provide as simple user interface with plenty of “white space”
- Provide supports for faculty development, including making meaning of data and action strategies within the context of the dashboard user interface.

The user stories were translated into functional requirements

User Story			
<p>As an instructor, I would like to have access to a more robust view of student interaction with the course content. For example, I would like more detailed information on number of page or content item views, discussion forum posts and reads, and quiz completions, potentially combined with information regarding the timing of access and other filter options. This will help with informing and improving course design and delivery by providing a detailed picture of student activity.</p>			
Framing Questions (from Project Team)	Break-Out Session Notes	DRAFT Functional Requirements	Prioritization

<b>Point of View:</b> How do you envision this information being presented? By current course? Past sections?	1) Would like to compare with previous courses 2) Course and section for current course	1) Information for current course	High
		2) Compare course information from the current year with previous ones	Moderate
<b>Level of Data Aggregation:</b> Should the data be aggregated (e.g., students, dates, content type)? Are there any hierarchies that should be reflected? -What do you consider as "other filter options"?	1) Start with a more aggregated/grouped level and expand to more detail information if necessary 2) Different "levels" of dashboard detail as option 3) Reduce the amount of work that the instructor has to do when looking at the dashboard (e.g., math, percentages, select dates)	1) Start with a more aggregated/grouped level and expand to more detail information if necessary	High
		2) Different "levels" of dashboard detail as option	High
		3) Limit the amount of work from the instructor when looking at the dashboard (e.g., math, percentages, select dates)	Moderate
<b>Data Characteristics:</b> How would you like to filter the data?	1) Any item in the course can be flagged for tracking... then a drop menu for item to generate report for class or for a student. [This was a Blackboard feature. ] 2) Posts and views (reads) by discussion board/forum 3) Filtering by week. 4) Unique clicks, not # of clicks. 5) Consider patterns leading up to class. Signal your teaching date(s) and work with a -1, -2, -3 days before that day to tag/aggregate/interpret. 6) Show courses and sub sections (to help with TA management). 7) Tagging - Select a group of items, leading into different sub-views on specific items. One question from the group was the tagging timing (pre or post?). One member indicated the ability to tag 'inside LMS' which terminology consistent with the syllabus (and other related materials). 8) Filter by device and content type. 9) Consider auto-filtering by "tag" (using the Canvas API we can extract the full list of course modules and activities in each module; through the retrieval process we can auto-	1) Filter to content and item level; or by activity type (ie discussions, quizzes, pages)	High
		2) Posts and views (reads) by discussion board/forum	High
		3) Filter by week	High
		4) Present information as unique clicks instead of number of clicks	High
		5) Default period in visualization is current week	High
		6) Show section-level detail for all sections taught by instructor (for example in order to help with TA management or other section-specific differentiating characteristics.)	Moderate
		7) Selecting a group of items, leading into sub-views on specific items.	Moderate
		8) Filter by device (e.g., mobile, desktop) and by content type	Moderate
		9) Explore filtering by "module" (using the Canvas API we can extract the full list of course modules as a group of related resources and activities); can we auto-	Moderate

	<p>generate tags such as belongsToModuleX or activity TypeY such as quiz, page, etc.).</p> <p>10) Filter by student project groups created in the course/Canvas.</p> <p>11) Create your own groupings of students as a filter?</p> <p>12) Identify which students are not engaging with/accessing the course material.</p>	<p>generate filters such as belongs to Module X</p>	
		10) Filter by student project groups created in Canvas	Low
		11) Create your own groups of students as filters 1. using dashboard data to filter aggregate group 2. selected individuals from pick list based on non-LMS data characteristics as aggregate or 3. either of the above with individual identities visible anticipating follow up action	Low
		12) Identify which students are not engaging with/accessing the course material.	Unsure
<b>Frequency of data updates:</b> How often does the data need to be refreshed?	1) Daily refresh of data. Filter by the course date.	1) Daily refresh of data.	High
<b>Dependencies:</b> Other data? Is there someone else we should get opinion from or consult?	1) Access to external resource (e.g., youtube link, link to an article, website...)	1) View of the access to external resource (e.g., youtube link, link to an article, website...)	High
	2) Would like data on third party tool access by students. ie did they access the tool.	2) Data on integrated third party tool simple access by students (i.e., did they access the tool?)	Moderate
	3) Would like data from integrated tools...	1) Data from integrated third party tools (showing activity withing that third party tool)	Low
<b>Constraints:</b> Feasibility, other tools required? Other data sources? Manual processes involved?	1) Avi notes this availability of third party data is dependent on the relationship between the two applications. New platform contracts being written to include access to third party data – linked by common students identifiers.	1) Availability of third party data is dependent on the relationship between the two applications. New platform contracts being written to include access to third party data – linked by common students identifiers.	Low
<b>Visualization Requirements:</b> How would you	1) Lots of white space 2) Ability to choose level of granularity for visuals (ie by days or	1) Dashboard with lots of white spaces. Do not overwhelm the user with information	High

like to visualize the data? (e.g., types of graphs) -Should we embed a timeline element to visualize these transactions based on weeks? Or days?	weeks)	2) Ability to choose the temporal level of granularity for visuals (i.e., by days or weeks)	High
<b>Faculty Support:</b> What are needs in this domain?	1) contextual support for pedagogical design strategies" ie 'Additional resources' tags, links or references to explore making meaning of data and possible actions'	1) Contextual support for pedagogical design strategies" ie 'Additional resources' tags, links or references to explore making meaning of data and possible actions	High

Full details are available in User Table spreadsheet linked as [Appendix 2](#). Work with the User Table has been put on hold pending development of example learning analytic dashboard reporting tools for review and feedback. Should any data beyond the current Canvas data set be added, a data governance review to ensure that the use falls within a reasonable expectation of use given the *Notice of Collection* and that it is consistent with student web page and University policies on privacy expectations.

The project team also documented additional requirements with higher levels of complexity were collected for User Story Themes 2 and 3. **However, given the objective of launching a beta version in fall 2022, it is recommended that development of these more advanced functions be paused while foundational data store and display infrastructure is established.** Additional features related to sequencing, correlation between student activity and grades, and high level course view may be addressed in future project phases.

## 2. Implementation Strategies

### Buy, Borrow or Build?

The project team review example initiatives Identified dashboard options from green paper, online examples and peers. We extended our environmental scan through networking, demo requests, research into peer activities (Educause, Gartner, Bay View Alliance, UofT networks, vendors).

Several organizations provided consultation or demonstrations related to their services and projects, however, none provided immediate promise to meet the current project needs. A short summary and general conclusion for three of the more promising platforms reviewed is provided below:

#### Intelliboard [October 19, 2021]

- Provides learning analytics dashboard tools displaying the data already available in Canvas reports.
- Their strength is retention, time to completion, and metrics related to student success and enrolment planning.

- Conclusion: The services provided by this third-party vendor do not meet the needs of this project at this time.

#### **RIGOR Academic Module Pilot Project [November 5, 2021]**

- Module-based analytics to compare expected student activity (utility/engagement) compared to actual activity across terms/years
- Strength is support of “tagging” of data points to monitor/support sense-making.
- Conclusion: This faculty engagement program and corresponding platform requires close engagement of instructors to input data for “tagging” of content. Risk of engagement with start-up and engagement of faculty prohibitive at this stage.

#### **UBC Learning Analytics [November 23, 2021]**

- UBC has several specialized platforms linked to research projects and/or addressing student success. Other institutions have prototyped similar tools and have offered to share code. Examples include:
  - [OnTask: Providing timely, personalized, and actionable feedback to learners](#)
  - [Threadz: Network analysis and visualization of Canvas discussions](#)
- At present we anticipate exploration of possible adoption in future phases of the project, in alignment with identified priorities as additional development resourcing and data becomes available.

#### **Chi2 Labs [January 7, 2022]**

- Consultants and service provides with strong provenance in LA provide course-Level instructor-facing dashboards and development of customized predictive modelling to identify “at-risk” students.
- Excellent range of example data displays, including text-sentiment analysis, social networks, clickstream and student-facing dashboard tools.
- Service can set up the tools within our cloud services, or work with sets of curated datasets.
- Offer workshops: <https://la-workshop.resources.unizin.org/predictive-modelling-i.html>.
- Conclusion: Much of their query framework has been published openly and can be adopted or adapted by UofT. Given no proprietary code, the QRS project team prefers not to become dependent on an external consulting team, but rather grow own capacity for sustainability.

### **Consultations with Peer Institutions**

Further insights were garnered through consultation with colleagues at peer institution who are sector leaders in implementation of Learning Analytics Initiatives:

George Siemens	Director	Centre for Change and Complexity in Learning	University of South Australia
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Briandy Walden	Associate Director	Student and Academic Services	UC Irvine
George Rehrey and Linda Shepard	Director, CLASS and Director, Assessment and Research		Indiana U - Bloomington
Marco Molinaro	Assistant Vice Provost for Educational Effectiveness	Center for Educational Effectiveness, Office of Undergraduate Education	UC-Davis
Glenda Morgan	Research Analyst	Higher Education	Gartner

## Implementation Strategy

The following were highlights from the many gems of advice shared with us by those who have gone before:

- Start with manageable scope for early success
- Link to value proposition/goals of university
- Include actionable strategies as part of overall implementation plan
- Link to faculty development supports (embedded, contextual)
- When student facing tools are considered, consultations with students are important, particularly when creating student supports
- Many report success when linking student demographic and SIS data to support insights into student characteristics (ie “Know Your Students”) – possible future phases.

## Next Steps

**Based on the progress to date, the following are recommended as next steps for continuation of the Instructor-Facing LA Dashboard project:**

- 1. Map functional requirements/metrics to data available from Quercus to inform data structure and feasibility [In progress in collaboration with ACT- QRS project].**
- 2. Confirm project lead(s) and team roles for instructor dashboard implementation Phase 2.**
- 3. Continue consultation and review of peer learning analytic platforms to develop example approaches to contextual faculty support resources to be included in the dashboard user interface. [In progress by DLI]**
- 4. Continue planning for community engagement, communication and socialization in parallel with the development process.**

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## Appendix 1: Dashboard User Personas



### 1) Average user Instructor (Novice -> Intermediate Expertise)

The majority of users – the ‘average’ instructor is interested in basic/essential teaching and learning improvements. E.g. use high level analytics to inform course design decisions such as designing an intuitive module structure, assessment interventions to improve grades or communication strategies to increase engagement broadly.

This user requires essential analytics and analysis. Essential dashboard items include high level and broad analytics details such as course grades, quiz/assignment results, student page views, student participation logs, overall time spent in course/with content. Reports should be easy-to-read and provide contextual information to support interpretation and action.

### 2) Power user Instructor (Intermediate -> Advanced Expertise)

A minority of users – the ‘power user’ instructor is interested in both essential teaching and learning improvements as well as more sophisticated course or professional development (SoTL) interventions. E.g. use more granular analytics to track individual course content items/areas and align to course outcomes, more targeted student engagement interventions for sub-sections of learners or individuals.

This user requires ability to further customize analytics reports and analysis. Access to more complex and multifaceted filters will allow them to leverage additional dashboard functions with more granular scoping and filtering. Examples would include details such as when and how individual items are accessed, how long a user spent on a quiz question, and how movement through the course and access to content can map to course outcomes. Ability to download and manipulate own data is a common request.

### 3) Educational Researcher (Advanced Expertise -> Linking Data)

**A minority and bespoke user** – the educational researcher will have ethics approval and is interested in a more extensive look at student course behaviours and results. E.g. use granular analytics to carefully track many users and many interventions over time and, likely, across different courses and sections. They are likely to want to combine learning system data with other data sources. Each will have a unique, non-standard set of research questions to address.

This user requires potential for integrated and advanced analytics and analysis. This user will potentially leverage all essential and sophisticated dashboard functions and may require longitudinal results over time such as comparing – at a glance - whole course progress, comparing courses in different sections, comparing courses from one year to the next. Provisions for linking data sets while remaining in a secure environment for data storage is an anticipated requirement.

**4) Academic Lead/Administrator (Novice -> Intermediate Expertise - Across courses)**

**From a limited group of** users in appropriate leadership roles, the administrator (senior staff or academic role such as dean or chair) is interested in program/divisional outcomes, measuring students' success and engagement across courses and monitoring how students move through course offerings, use of various assessment tools or other Canvas functions/resources. This may be related to program or curricular review and renewal and anticipates the needs of the "Program Level – Deep Dive" initiative within the UofT LA program of activities.

It is anticipated that these users will require data gathered across various departmental course offerings and sections, and longitudinal comparisons. This user requires basic/essential analytics and analysis – however must be readily available broadly, across different courses. Data of interest is likely to be high level activity patterns, assessment results, communication strategies in relation to student success, completion and retention.

Appendix 2: Functional Requirements for Instructor-Facing LA Dashboard

Results of the consultation with the Learning Analytics User Table is available

[DRAFT - LA Instructor Dashboards Functional Requirements.xlsx](#)