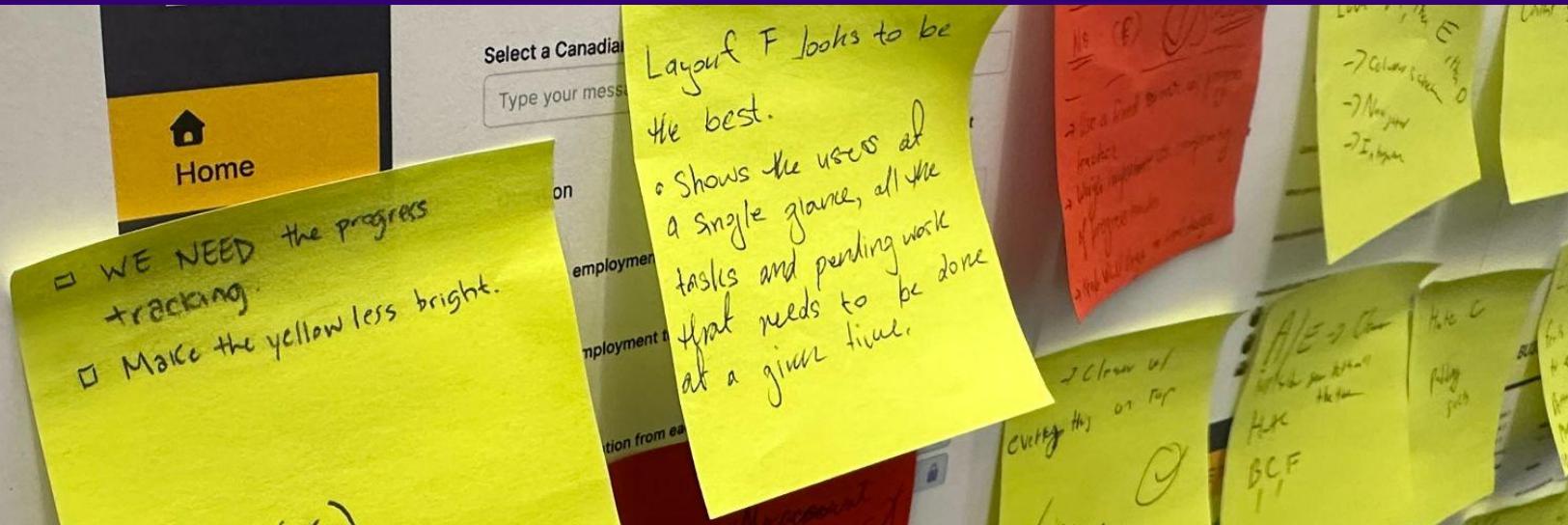


# Comparative Usability Report



November 4 2025

# Executive summary

The Lazaridis School of Business & Economics at Wilfrid Laurier University's Start-Up Lab was contracted by the professors of BU354, Human Resources Management, **to build a dashboard for their weekly assignments**. This document summarizes the design decisions made for this project.

The design process was led by **Derek Song**, a co-op student working under the Laurier Start-Up Lab. After getting the opinions of more than **59 students**, the resulting platform features a collapsible sidebar aligned with Laurier's visual identity and an interface inspired by MyLearningSpace, Google Docs, and Laurier Navigator. The home dashboard prioritizes upcoming deadlines, and Dashboard A (tested against 7 other medium-fidelity prototypes) will be further refined based on strong student preference.

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<https://www.figma.com/proto/iyxzz8QmrJeckuwIIBQChe/BU354-Dashboard-Public-Figma?node-id=1-3383&p=f&t=e2iqowekNUdeY7If-1&scaling=min-zoom&content-scaling=fixed&page-id=1%3A3109&starting-point-node-id=1%3A3383&showproto-sidebar=1>
- **Page 9-11:** Introduction to the sample size
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*Continued on next slide*

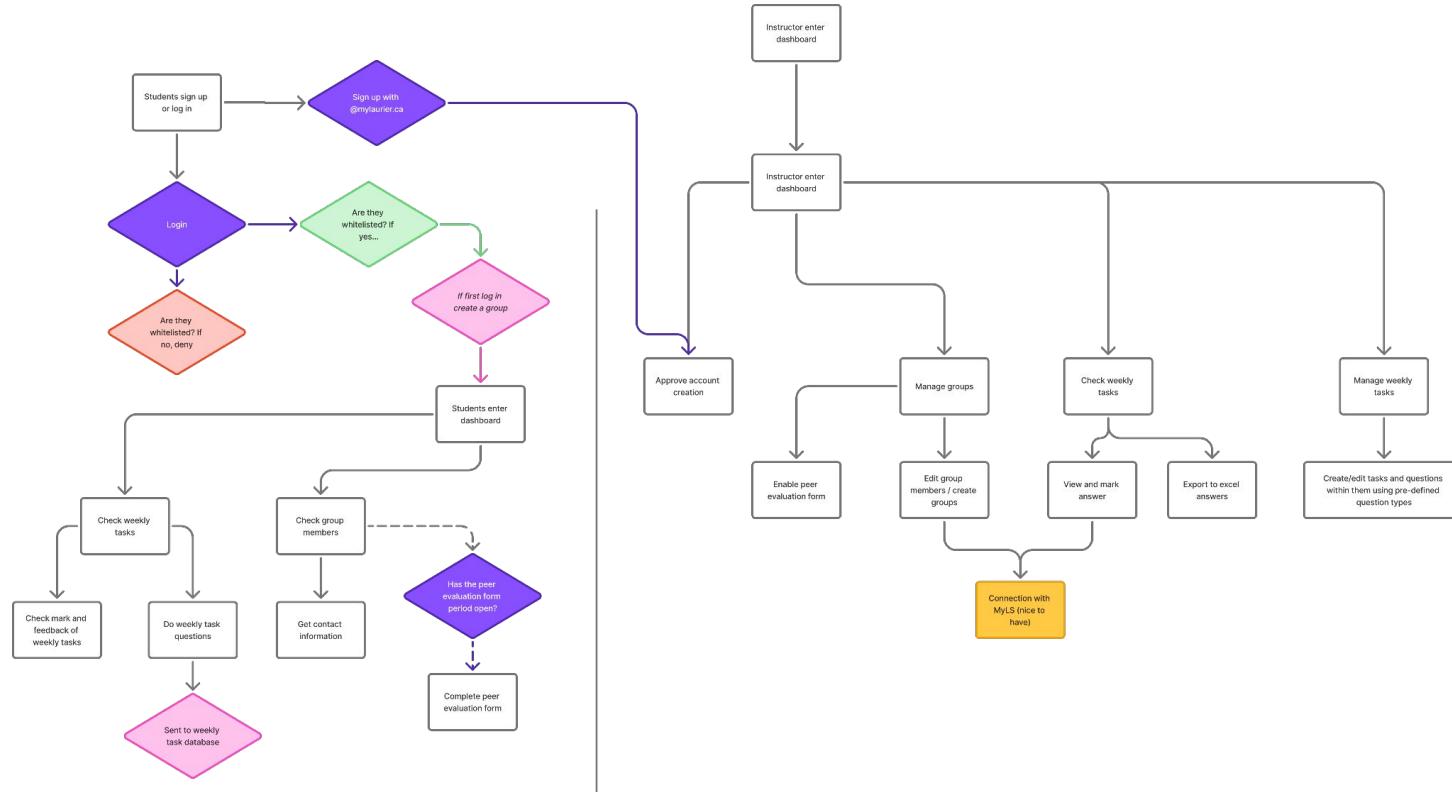
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- **Page 38-41:** Appendix: formula sheet
  - Can also be found at:  
<https://github.com/twotoque/BU354-UXdata/blob/main/formuale.pdf>

PDFs of all graphs can also be found at:

<https://github.com/twotoque/BU354-UXdata/tree/main/pdfs>

# User flow



# Examples of similar learning websites

The collage displays five distinct learning management system (LMS) platforms:

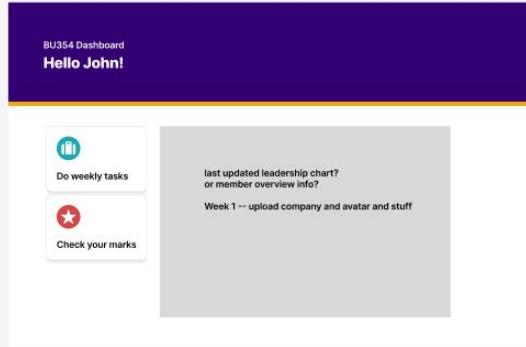
- Classroom:** Shows a classroom view for "English 101" with a green theme, displaying student names and a class code.
- skilljar:** Shows the "Welcome to the Intro to Program Strategy Course (1.08)" page, featuring a video player and course details.
- talentLMS:** Shows the "Home" page with course statistics and a course catalog for "COOP-001-0 - Co-op Education Work Term 1".
- intro-demo:** Shows the "Modules" section with a list of assignments and a yellow arrow pointing to the "Course Status" button.
- Dashboard:** Shows a dashboard with course counts, user stats, and a "REWARD" section.

# Low-fidelity prototypes

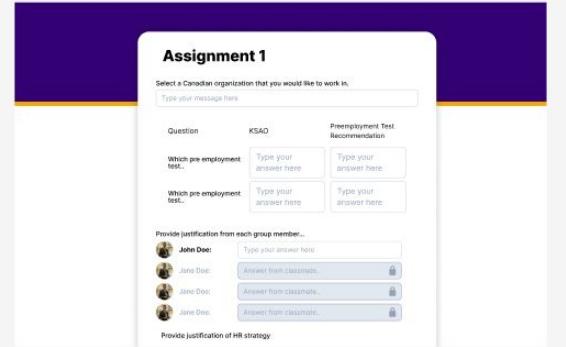
MacBook Pro 16" - 4



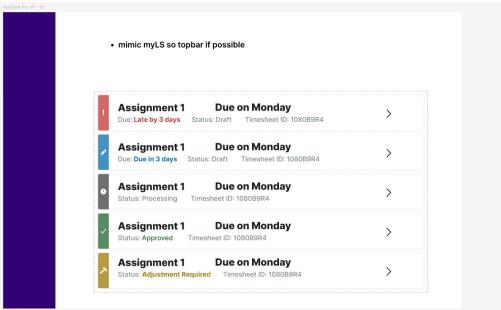
MacBook Pro 16" - 6



MacBook Pro 16" - 3



• mimic myLS so topbar if possible



# Mid-fidelity prototypes

**A**

**B**

**C**

**D**

**E**

**F**

Viewable at:

<https://www.figma.com/proto/iyxzz8QmrJeckuwIBQChe/BU354-Dashboard-Public-Figma?node-id=1-3383&p=f&t=e2iqowe kNUdeY7lf-1&scaling=min-zoom&content-scaling=fixed&page-id=1%3A3109&starting-point-node-id=1%3A3383&show-proto-sidebar=1>

# Sample size



# ~59 Students

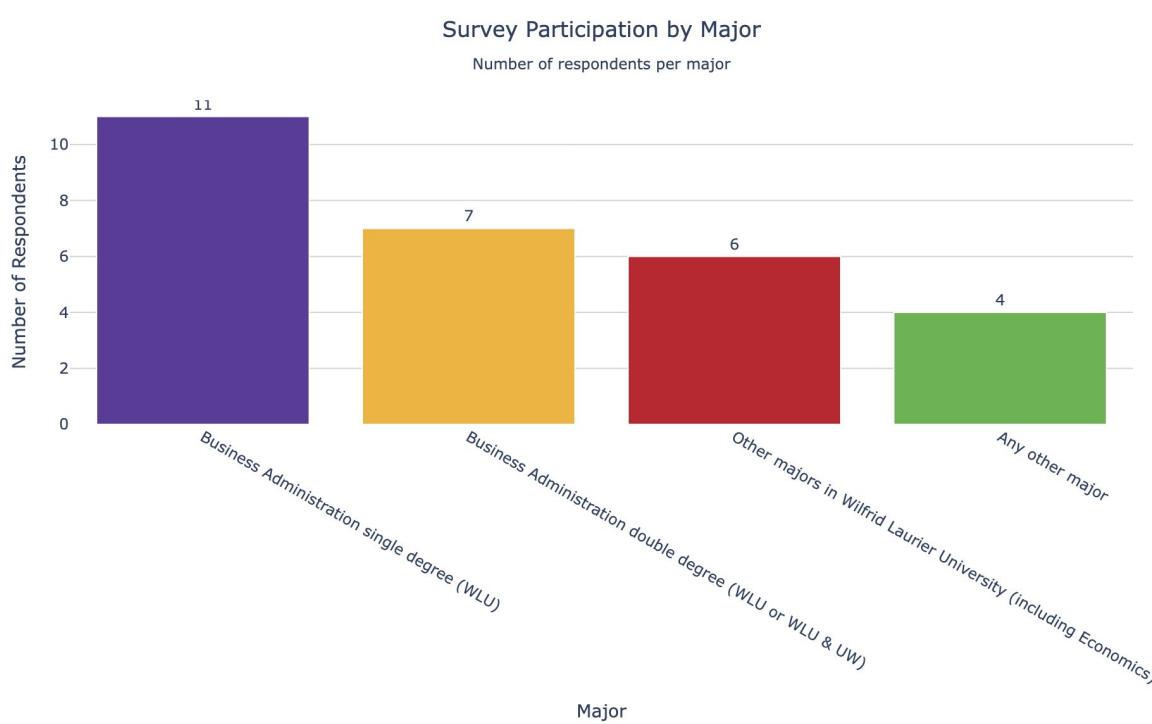


**28 survey  
respondents**



**31 sticky notes**  
*Students may fill out  
multiple sticky notes, but  
most only did 1.*

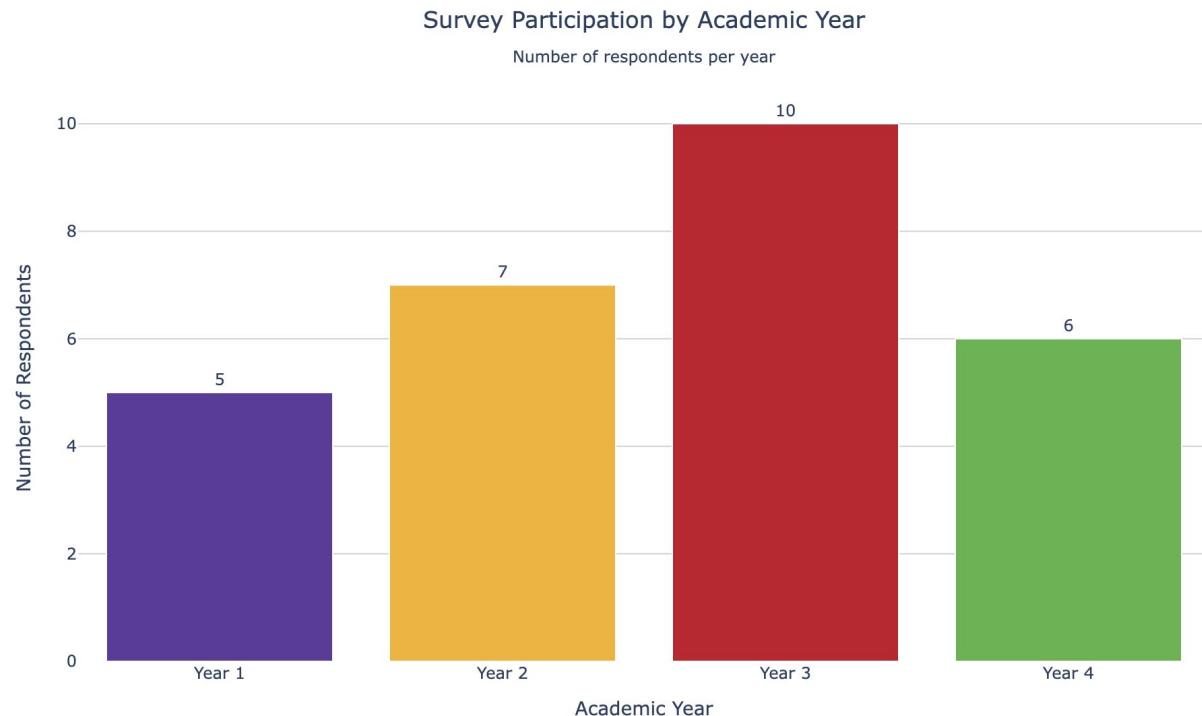
# Sample size



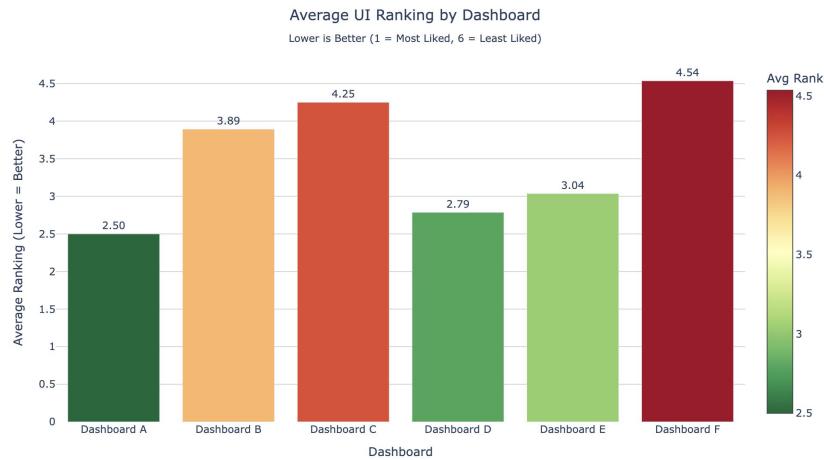
**18 (64%) survey respondents will need / had to take BU354**

*Sticky note participants were not asked about major*

# Sample size



# Findings

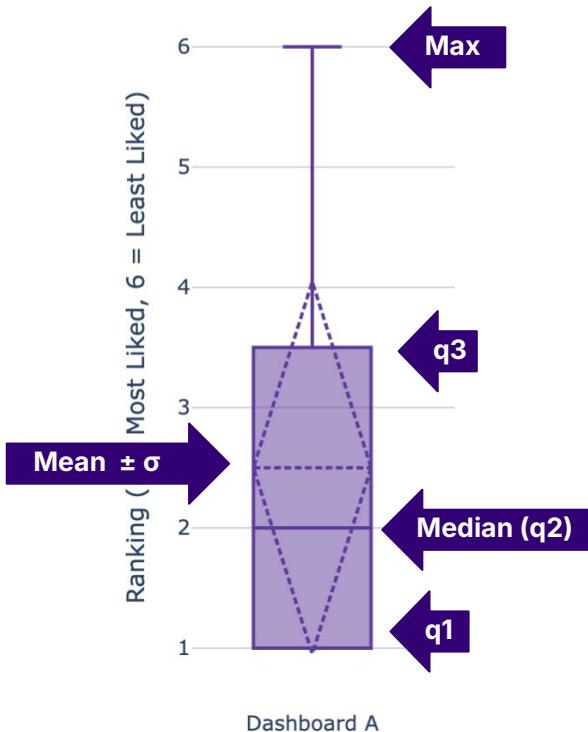


Bar graph with only survey respondents



Bar graph with both survey respondents and sticky note data

# Sample distribution



- If median is lower than mean: most respondents found it **positive** since ratings cluster at lower end (*right skewed*)
- If median is higher than mean: most respondents found it **negative** since ratings cluster at higher end (*left skewed*)

# Sample distribution

**Specific formulas are also explained in the appendix, located on the end of this document.** While most of it is automated by Python libraries, the document outlines how each value is attained.

This document is also viewable here:

<https://github.com/twotoque/BU354-UXdata/blob/main/formuale.pdf>

## BU354 Dashboard: Comparative Usability Report - Formulas

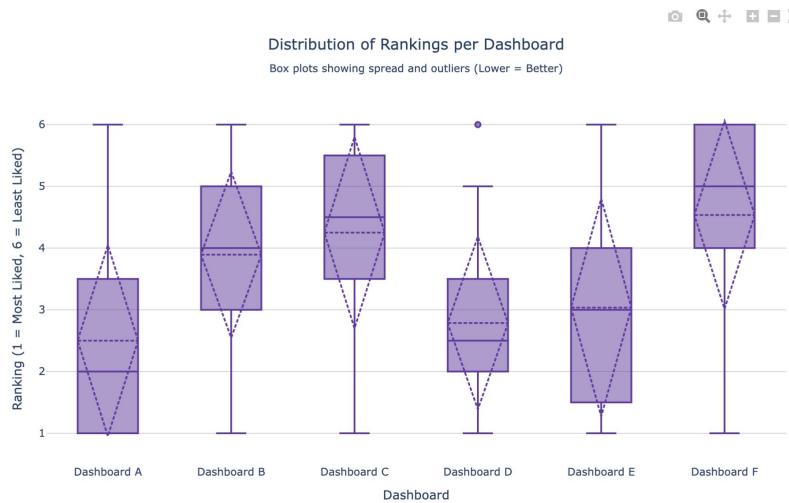
Derek Song

**Note.** For clarity and readability, the formulas in this document avoid using the general notation  $n$  (total responses) and  $k$  (number of categories). Instead, each formula is written directly in terms of the specific variables used in the BU354 UX analysis (e.g., observed counts for dashboard A vs dashboard E).

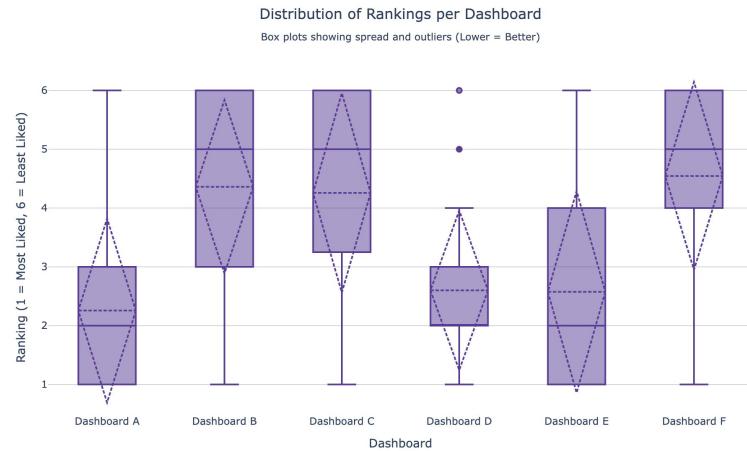
$$s_d = \sqrt{\frac{\sum_{i=1}^{\text{number of respondents}} (d_i - \bar{d})^2}{\text{number of respondents} - 1}}$$

$$\chi^2 = \frac{(O_{\text{category 1}} - E_{\text{category 1}})^2}{E_{\text{category 1}}} + \frac{(O_{\text{category 2}} - E_{\text{category 2}})^2}{E_{\text{category 2}}}.$$

# Sample distribution



**Distribution with only survey respondents**



**Distribution with both survey respondents and sticky note data**

# Sample distribution

Two frontrunners, though dashboard A is slightly preferred

Only  
Survey

## Dashboard A:

- Median: 2
- Mean: 2.5
- Standard Deviation: 1.546

## Dashboard E:

- Median: 3
- Mean: 3.035
- Standard Deviation: 1.762

All  
Data

## Dashboard A:

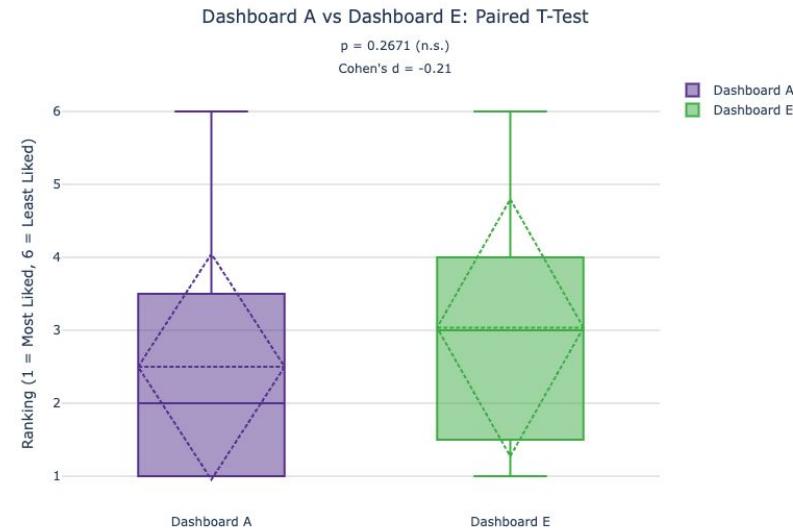
- Median: 2
- Mean: 2.25
- Standard Deviation: 1.564

## Dashboard E:

- Median: 2
- Mean: 2.575
- Standard Deviation: 1.715

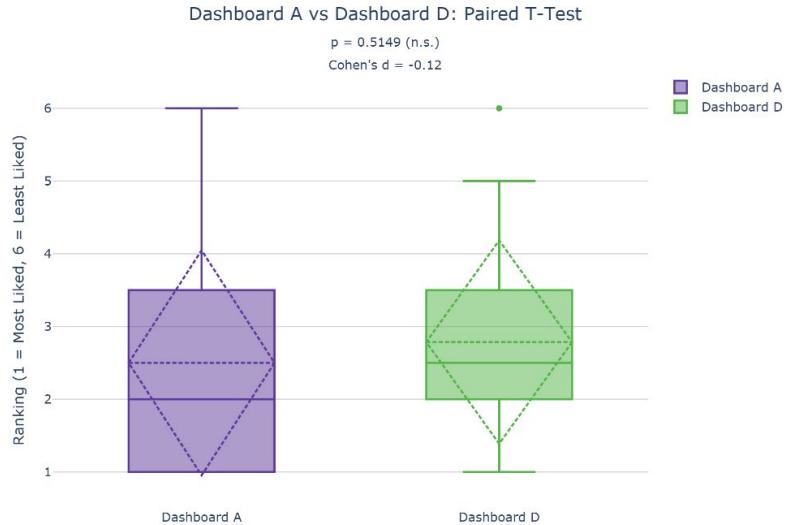
# T-test: A vs E dashboards

Slight trend toward liking dashboard A more, but effect size is small (Cohen's  $d = -0.21$ ), and students did not reliably prefer dashboard A compared to D ( $p=0.2671$ )

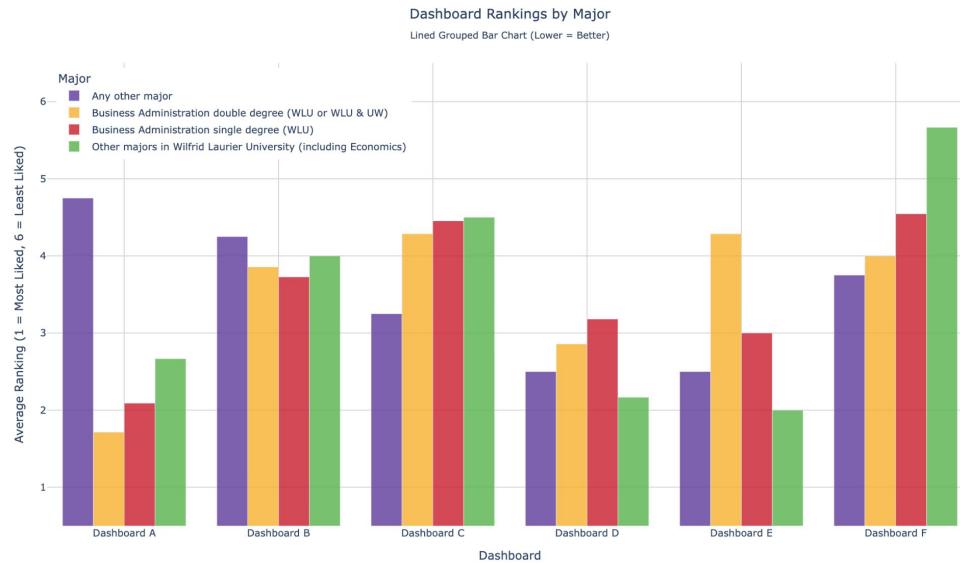


# T-test: A vs D dashboards

**Slight trend toward liking dashboard A more**, with the effect size being negligible (Cohen's  $d = -0.12$ ), and again students did not reliably prefer dashboard A compared to D ( $p=0.5149$ )

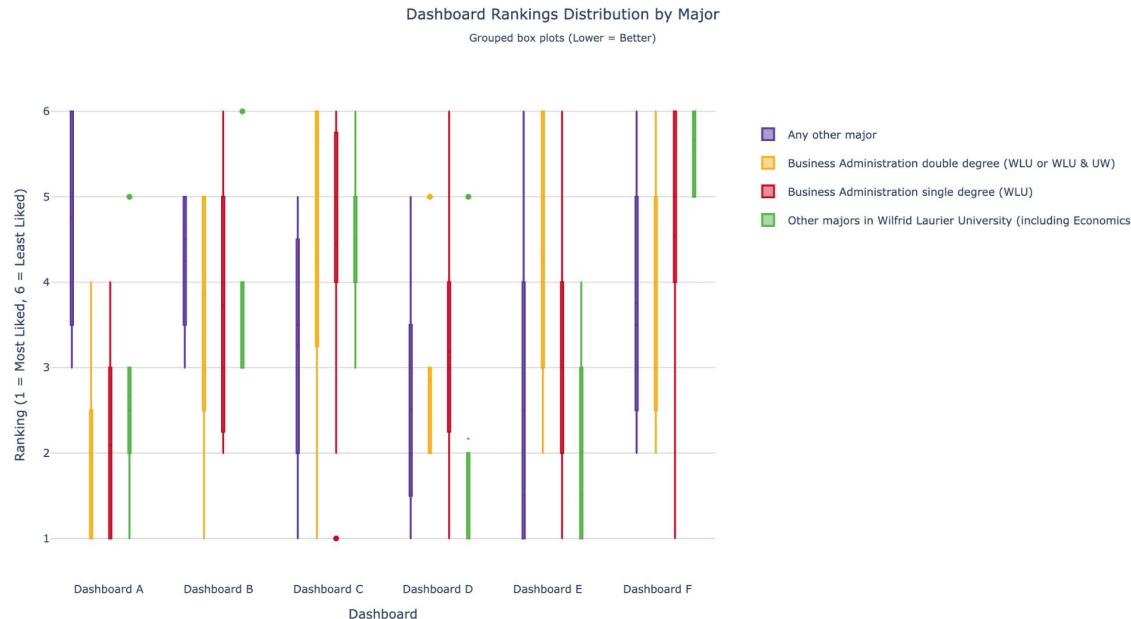


# Findings



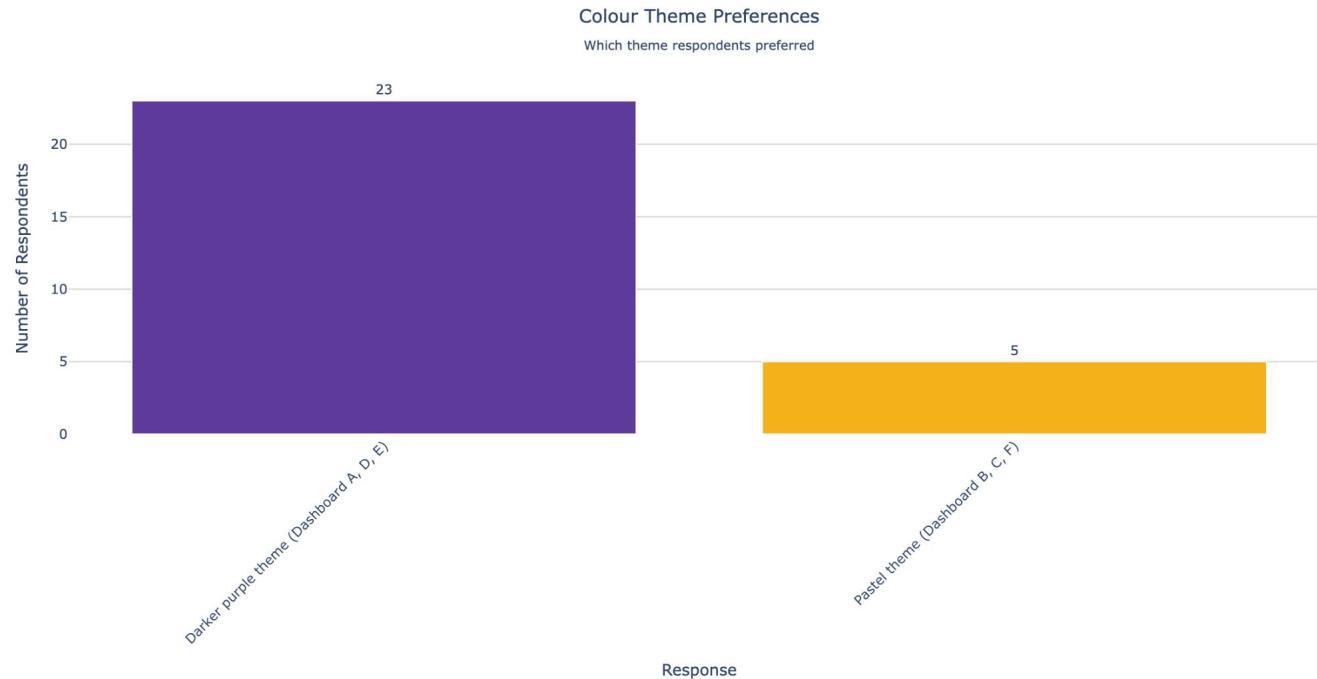
**Bar graph with only survey respondents by major  
Dashboard A wins by students who have to take BU354  
(red, yellow)**

# Findings



**Bar graph with only survey respondents by major**

# Colour scheme and features



**Colour scheme purple wins**

# Colour scheme and features

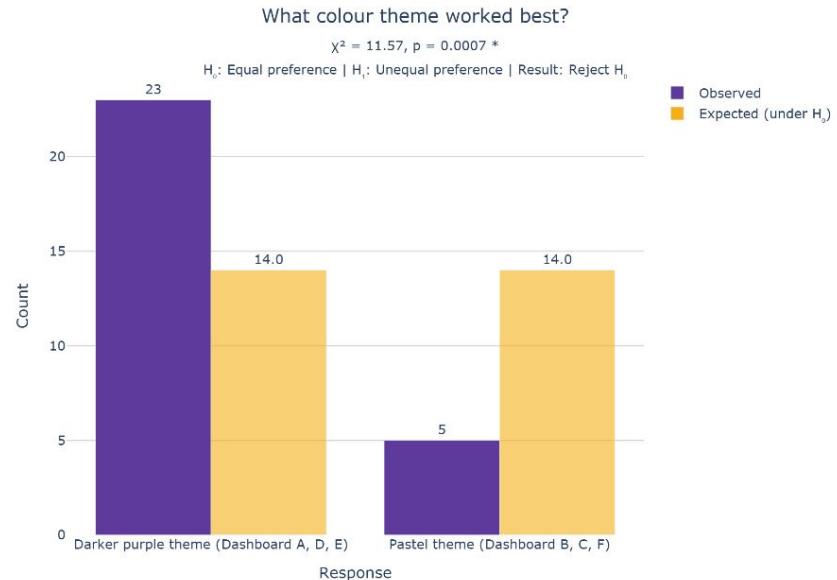
## Sticky note respondents preferred purple colour scheme

- “Darker shades (purple) consistent with Laurier brand”
- “Lemon (brighter) yellow colour scheme is bad, feels like Windows XP colours”
- “Hate B, contrast sucks”
- “Keep primary: Purple, secondary: Yellow”
- “Make the [highlighted] yellow less bright”
- “E is okay due to the (tinted) yellow”

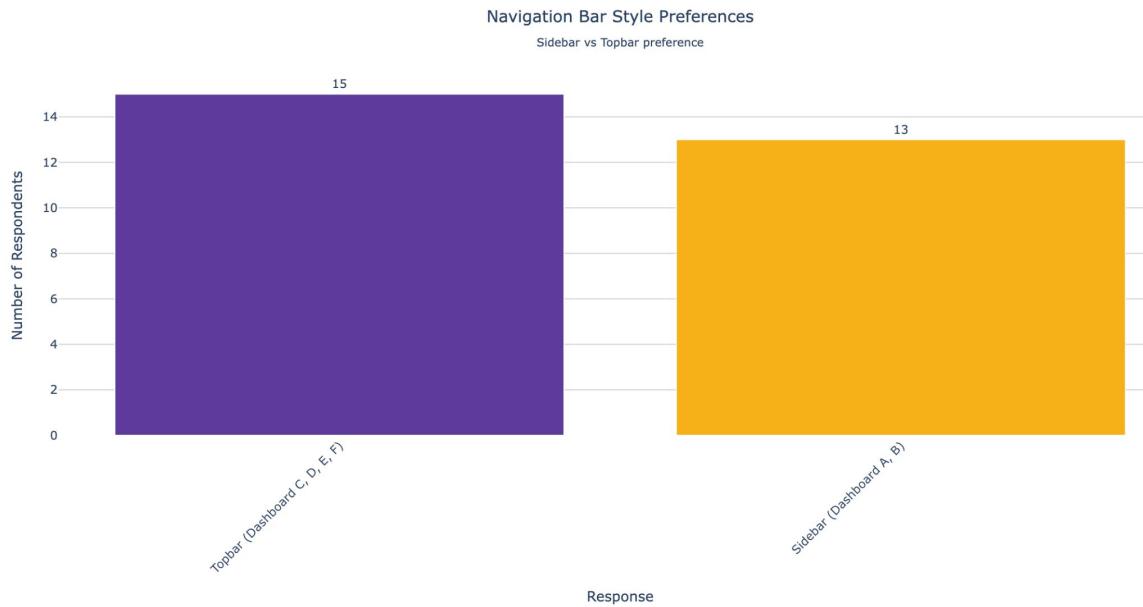
# Colour scheme and features

Doing a chi-squared test, students did **significantly prefer** the darker purple theme over the patel theme.

Given null hypothesis ( $H_0$ ) assuming students like them equally, alternate hypothesis ( $H_1$ ) assuming students like one over another, with  $p < 0.007$  then we reject the null hypothesis.



# Colour scheme and features



**While a “topbar” slightly wins in the survey, most sticky note respondents did prefer a sidebar**

# Colour scheme and features

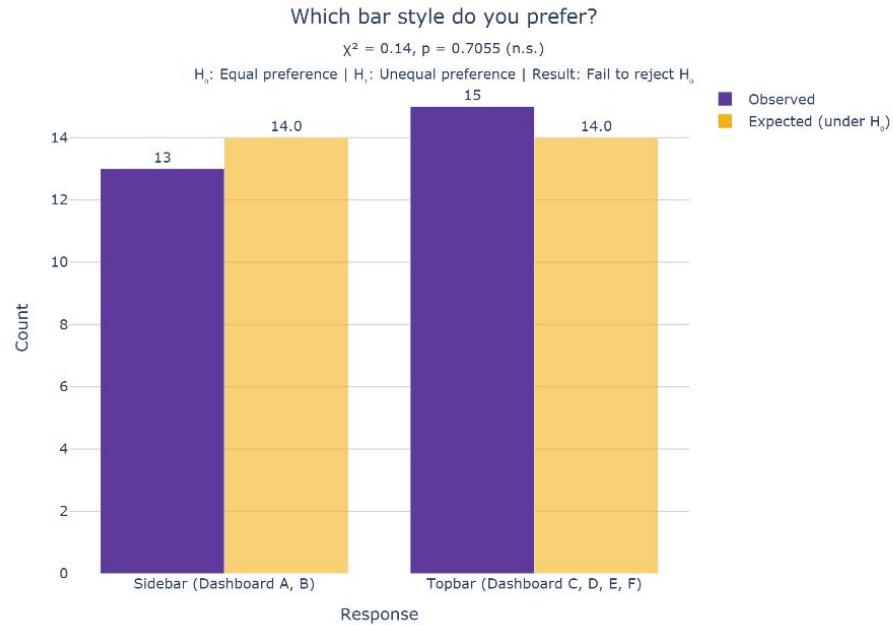
**Sticky note respondents divided on top or side bar, but somewhat preferred top bar. Comparisons with Navigator (sidebar) and MyLearningSpace/Google Docs (topbar)**

- “Side bar (A) is easiest to see all of the content”
- “A looks like Navigator”
- “Used a fixed top bar w/ progress tracker”
- “A would be nice if the sidebar was collapsible”
- “Favorite is A, then D. since easier to scroll side bar”
- “Sidebar takes too much space”
- “Never a fan of side bar, more intuitive if on top, so used to using top bar (MyLS, Docs)”

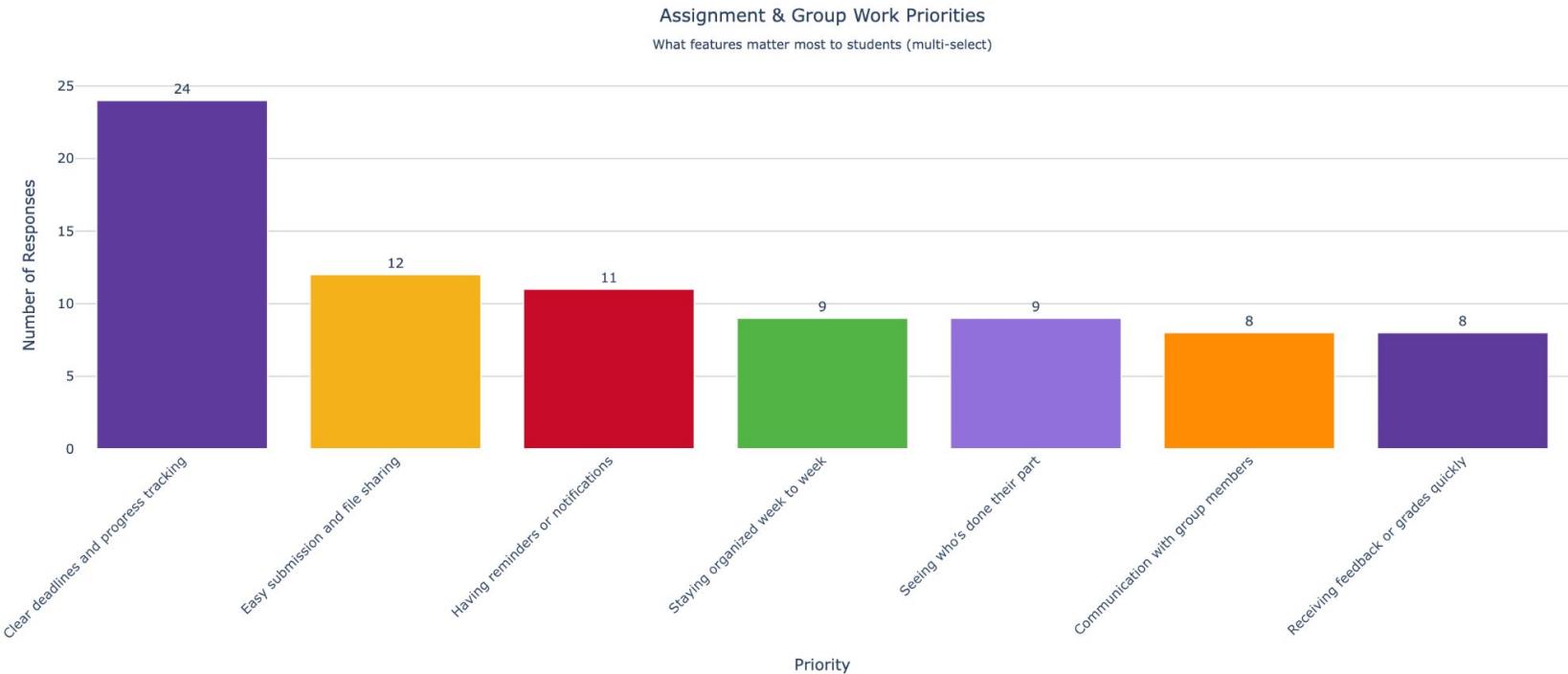
# Colour scheme and features

Doing a chi-squared test,  
students did **not**  
**significantly prefer** sidebar  
navigation or topbar  
navigation.

Given null hypothesis ( $H_0$ ) assuming students like them equally, alternate hypothesis ( $H_1$ ) assuming students like one over another, with  $p=0.78$  then we fail to reject the null hypothesis.



# Colour scheme and features



# Colour scheme and features

## Most users wanted a progress bar tracker

- “Used a fixed top bar w/ progress tracker”
- “Weigh importance vs complexity of progress tracker”
- “Progress Bar is confusing”
- “Progress bar, would rather see it on top”
- “Progress bar → Easy to navigate”
- “We need the progress tracking”

# Colour scheme and features

## Users liked the inclusion of the Wilfrid Laurier University logo

- “Keep WLU logo in final design”
- “D + E: use WLU logo”
- “Top bar is better, Laurier logo is [good], top font is good”
- “WLU logo is trivial to the school”
- “Doesn’t like E but likes the Laurier Logo”

# Colour scheme and features

## **My Account should be separated from content hierarchy**

- “E: my account separate”
- “Likes how my account is separate”

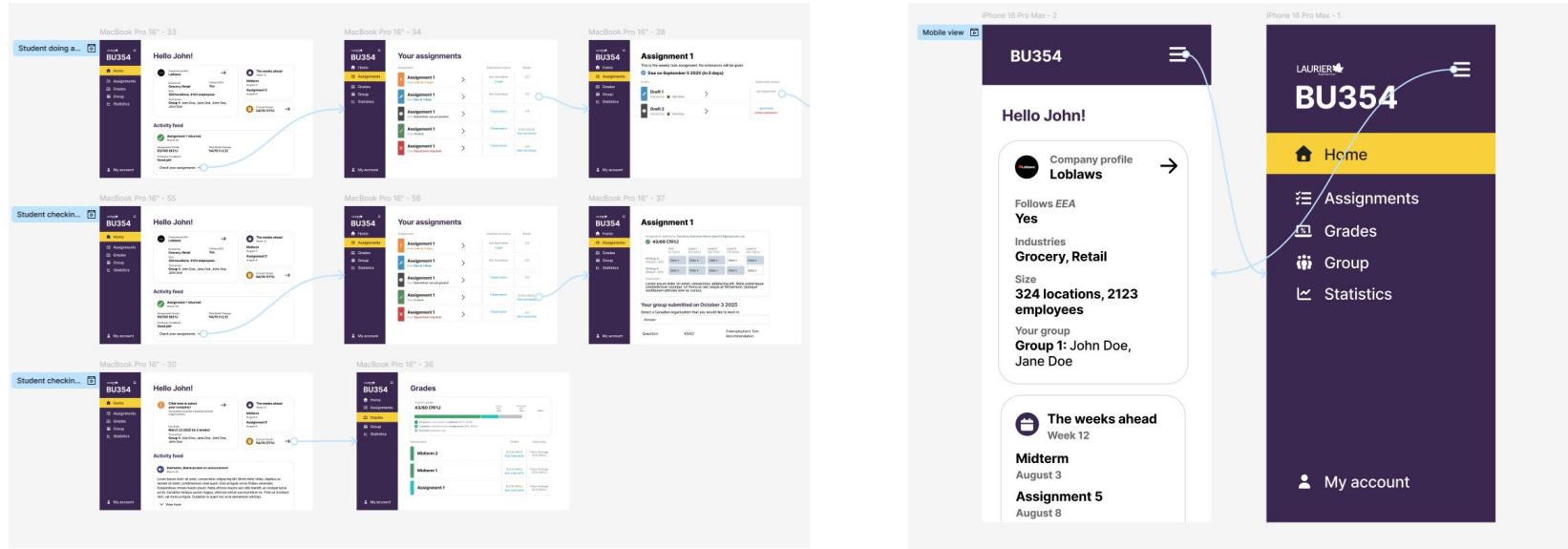
## **Dashboard can be adapted for other courses (like bohr.wlu.ca)**

- “Confused on why we are building this platform solely for one course”

# Final recommendations

- 1. A collapsible sidebar with the Wilfrid Laurier University logo, with user interface elements similar to MyLearningSpace, Google Docs, & Laurier Navigator**
- 2. Usage of the purple primary colour scheme**
- 3. Upcoming deadlines must be present in the home dashboard**
- 4. Dashboard A will be adapted due to the preference by students who will need to take BU354**

# High-fidelity prototype



With 10+ user flows for both student and professors. Viewable at:

<https://www.figma.com/proto/iyxzz8QmrJeckuwIIBQChe/BU354-Dashboard-Public-Figma?node-id=1-6026&p=f&t=nD5LAKoPBDNLzlr-1&scaling=min-zoom&content-scaling=fixed&page-id=0%3A1&starting-point-node-id=1%3A6026&show-proto-sidebar=1>

# High-fidelity: Question system

Based on ShadCN  
components to speed  
up development.

The screenshot displays a high-fidelity representation of a question system interface, likely a prototype or a detailed wireframe. It includes several components:

- Individual answer:** Shows a user profile for "John Doe" and a text input field labeled "Type your message here".
- Classmate answer:** Shows a user profile for "Jane Doe" and a text input field labeled "Answer from classmate..." with a lock icon.
- yes/no question:** A dashed-line section containing two questions about employment equity, each with "Yes" and "No" buttons and an "Explain your answer" input field.
- row flex categorial:** A section titled "Provide justification of HR strategy" with a sub-section "HR Strategy Component: What part of the organization... Chosen". It includes three input fields: "Type your answer here", "Type your answer here", and "Type your answer here", along with a "Example of chosen HR statement..." placeholder. A "Add another row" button is also present.
- individual question:** A section titled "Provide justification from each group member..." showing profiles for four users ("John Doe", "Jane Doe", "Jane Doe", "Jane Doe") and their corresponding answer input fields, each with a lock icon.
- row fixed categorial:** A section with three columns: "Question", "KSAO", and "Preemployment Test Recommendation". It contains two rows of questions: "Which pre employment test..." and "Which pre employment test...". Each row has two input fields: "Type your answer here" and "Type your answer here".

# High-fidelity: Sidebar

Professor dashboard

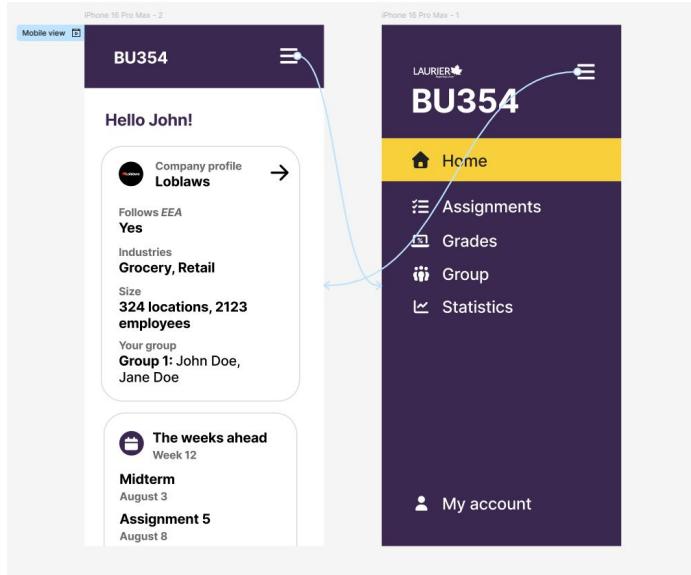
The screenshot shows a Professor dashboard with a dark purple header and sidebar. The sidebar on the left contains the user's name (LAURIE), course code (BU354), and navigation links: Home, Grade/create assignments, Manage groups, Statistics, Manage accounts, and My account. The main content area features a "Hello John!" greeting, a progress bar for Assignment 2 showing 5 groups marked (green) and 7 groups submitted (teal), and a "The weeks ahead" section for Week 12. It also includes an "Activity feed" with a placeholder for a new announcement and a recent post from Instructor Name.

Professor dashboard

This screenshot shows the same Professor dashboard as above, but with the sidebar collapsed into a vertical menu on the far left. The main content area remains identical, displaying the "Hello John!" greeting, assignment progress, weeks ahead information, activity feed, and recent post from Instructor Name.

Sidebar can be collapsible.

# High-fidelity: Sidebar



A similar system is used for mobile.  
This time, only a fixed top bar is there to mimic MyLearningSpace's flow.

# High-fidelity: Announcement system

❖ Create announcement

Type to create new announcement

Type to create new announcement

Post →

❖ Assignment return

**Assignment 1 returned**  
March 30

Assignment Grade  
**83/100 (83%)**

Final Mark Change  
**54/70 (+2.3)**

Professor Feedback  
**Good job!**

Check your assignments →

❖ Announcement

**Instructor\_Name posted an announcement**  
March 30

Place Team

**1 Group 1**  
John Doe, John Doe, John Doe

**2 Group 2**  
John Doe, John Doe, John Doe, John Doe

**3 Group 3**  
John Doe, John Doe, John Doe, John Doe

**4 Group 4**  
John Doe, John Doe, John Doe, John Doe

**5 Group 5**  
John Doe, John Doe, John Doe, John Doe

**View more**

❖ Announcement: Something due

**Peer evaluation form due**  
Before January 30

Complete form →

Similar to Google Classroom.

# High-fidelity: List of assignments system

❖ Draft

<b>Draft 1</b> Started by: John Doe	>	Not Submitted	
<b>Draft 1</b> Started by: John Doe	>	Submitted Undo submission	

❖ Assignment from professor

<b>Assignment 1: Group 1</b> Company: Loblaw Members: John Doe, John Doe, John Doe, John Doe Status: Submitted, not yet graded	>	Not Submitted	-/10
<b>Assignment 1: Group 1</b> Company: Loblaw Members: John Doe, John Doe, John Doe, John Doe Status: Graded	>	1 Submission See comments	9.5/10 (95%) See comments
<b>Assignment 1: Group 1</b> Company: Loblaw Members: John Doe, John Doe, John Doe, John Doe Status: Adjustment required	>	1 Submission See comments	-/10 See comments

❖ Assignment new

<b>Assignment 1</b> Due: Late by 3 days	>	Not Submitted 1 Draft	-/10
<b>Assignment 1</b> Due: Due in 3 days	>	Not Submitted	-/10
<b>Assignment 1</b> Due: Submitted, not yet graded	>	1 Submission	-/10
<b>Assignment 1</b> Due: Graded	>	1 Submission See comments	9.5/10 (95%) See comments
<b>Assignment 1</b> Due: Adjustment required	>	1 Submission See comments	-/10 See comments

Similar wording to MyLearningSpace, using colours and symbols to make statuses stand out better.

# Appendix

## Formula sheet

# **BU354 Dashboard: Comparative Usability Report - Formulas**

**Derek Song**

**Note.** For clarity and readability, the formulas in this document avoid using the general notation  $n$  (total responses) and  $k$  (number of categories). Instead, each formula is written directly in terms of the specific variables used in the BU354 UX analysis (e.g., observed counts for dashboard A vs dashboard E).

## Paired sample t-tests

In the BU354 Comparative Usability Test, a paired samples *t*-test is performed to compare the rankings of two dashboards. The Python code uses `scipy.stats.ttest_rel` package. Internally it computes the difference of the observed difference between the scores of the two dashboards.

$$d_i = \text{dashboard A}_i - \text{dashboard E}_i$$

The mean of these paired differences is then calculated as:

$$\bar{d} = \frac{1}{n} \sum_{i=1}^n d_i$$

Since the data represent a sample of some students as opposed to the population of students, the sample standard deviation of the differences is used:

$$s_d = \sqrt{\frac{\sum_{i=1}^{\text{number of respondents}} (d_i - \bar{d})^2}{\text{number of respondents} - 1}}$$

The paired *t*-statistic computed by `ttest_rel` is equal to:

$$t = \frac{\bar{d}}{s_d / \sqrt{\text{number of respondents}}}, \quad df = \text{number of respondents} - 1$$

This difference compares the observed mean difference to the standard error of the mean difference (we check the standard error here to find out how "messy" our data is.). If we have a small standard error (usually from larger sample sizes or low variability) we get a bigger *t*-value.

In addition to statistical significance, we also find out the effect size using Cohen's *d* for paired samples, which uses the standard deviation of the difference scores:

$$d_{\text{Cohen}} = \frac{\bar{d}}{s_d}$$

The effect size indicates how meaningful the difference is. For example, an effect size of *d* = 0.21 is considered small, suggesting that students did not show a strong preference between Dashboard A and Dashboard D. The Python code mirrors this formula directly by dividing the mean difference by the standard deviation of the paired differences.

## Chi-square tests

The chi-square goodness of fit test is used to determine whether the observed distribution of responses differs from an expected distribution. Here we always assume

$H_0$  : All response categories are equally preferred. (e.g. students do not prefer X over Y)

and the alternative hypothesis is:

$H_1$  : At least one category is preferred more or less than expected

Under the equal-preference assumption, the expected count for each category is  $n/k$ . As we will always do a dual comparsion in this report, this simplifies to

$$E = \frac{\text{number of respondents}}{2}.$$

for each category. To find out the chi-square statistic, we compute: (with O being observed, and E being expected)

$$\chi^2 = \frac{(O_{\text{category 1}} - E_{\text{category 1}})^2}{E_{\text{category 1}}} + \frac{(O_{\text{category 2}} - E_{\text{category 2}})^2}{E_{\text{category 2}}}.$$

with degrees of freedom:

$$df = \text{number of categories} - 1.$$

To quantify the magnitude of the deviation from equal preference, we compute Cramér's  $V$ :

$$V = \sqrt{\frac{\chi^2}{\text{number of respondents}(\text{number of categories} - 1)}}.$$