

# Various Design Projects in the ASSISTments Foundation

*A Major Qualifying Project*

*submitted to the Faculty of*

**WORCESTER POLYTECHNIC INSTITUTE**

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*degree of Bachelor of Science*

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Report submitted to:

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## **Abstract**

ASSISTments is a free online math education platform for K-12 students and teachers operated by Worcester Polytechnic Institute and the ASSISTments foundation. This Major Qualifying Project (MQP) consisted of several design tickets and sub-projects, all relating to the ASSISTments Foundation and associated projects. In this MQP, I worked alongside full-time employees in an Agile environment to improve the student and teacher user experience of products in the ASSISTments foundation. In the first sub-project, I designed a feature to visualize mastery of math standards in the student experience. In the second sub-project, I completed user discovery on an adaptive assignment feature. In the third sub-project, I conducted accessibility testing on the teacher experience of the platform.

## **Acknowledgements**

I would like to thank Professor Neil Heffernan for giving me the opportunity to work with the ASSISTments foundation for the past academic year. I express my deepest gratitude to Kyle Scheuing and Tom Bolton of the ASSISTments foundation who provided me constant guidance and support throughout my MQP. Additionally, I would like to thank Professor Stacy Shaw for her insights on learning psychology that aided in the mastery visualization project. I would also like to thank Morgan Lee and Yang Lyu for their work on the MQP that was the catalyst for the mastery visualization project.

Lastly, I would like to thank everyone in the ASSISTments foundation for providing a supportive and enriching environment to work in and grow professionally.

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## **CHAPTER 1. Introduction**

ASSISTments is an online math education platform that provides formative practice and assessment tools to teachers and schools to increase student learning outcomes (ASSISTments, n.d.). The ASSISTments platform allows teachers to deliver and tailor math assignments based on their school's math curriculum. Teachers can either assign pre-existing problem sets aligned with established math curriculums or pull problems from a library to customize their own problem sets. These problem sets can then be easily assigned to students through integrated learning management systems like Google Classroom and Canvas. During assignments, students can receive valuable support like hints and feedback on problems to aid in their understanding of the material. Additionally, teachers are provided with detailed reports and insights on student's performance and progress on assignments. Based on the reports, teachers can make well-informed decisions regarding lesson delivery and material for their students. For this MQP, I worked on several projects to improve the teacher and student experience for the ASSISTments platform.

## **CHAPTER 2. Design Tickets**

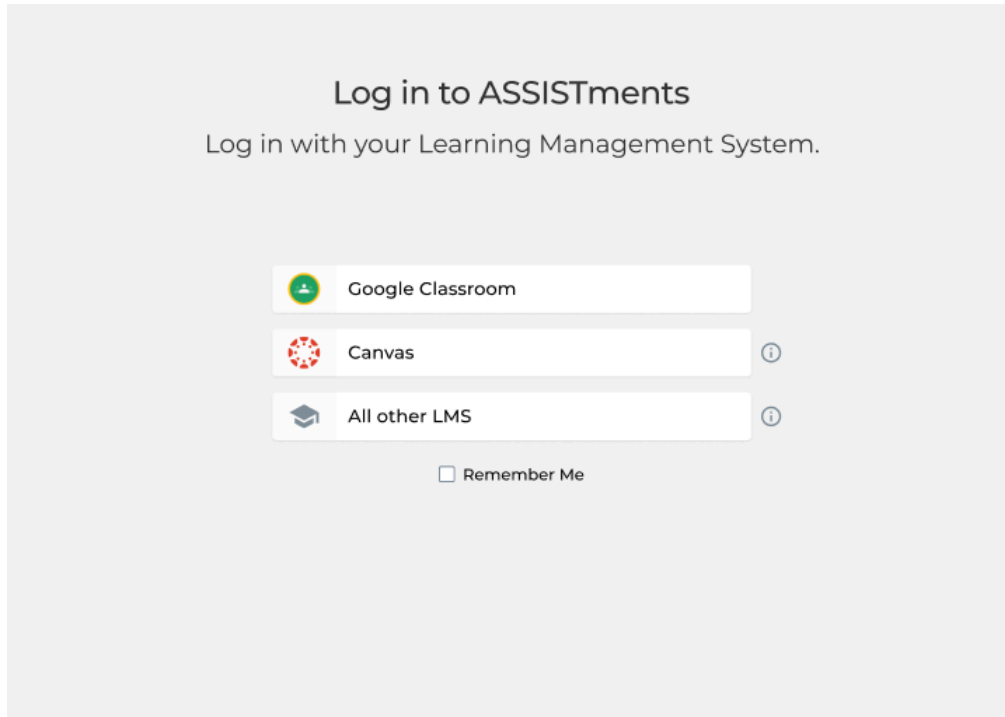
Throughout my MQP, I was fully integrated in the user experience design team at ASSISTments. I worked alongside full-time employees to make updates, additions and improvements to the student experience (SXP) and teacher experience (TXP) of the ASSISTments learning platform. Design tickets are assigned to the team by Ms. Dawn Peterson (SXP Product Owner) and Ms. Cindy Starks (TXP Product Owner). The tickets are assigned through Jira, an issue and project management system. Information crucial to the ticket like design files, requirements, progress, comments and more are visible on Jira. Each ticket is designated its own design file on Figma where designs and mockups are created, kept, and maintained. The team would meet at the beginning of each week for a design collaborative to discuss progress on designs and present designs for internal feedback from the design team. A meeting would also occur weekly to discuss any new tickets or current ticket progress with product owners. Team communication took place remotely using tools such as Zoom and Slack. This section discusses various tickets I completed throughout my MQP.

### **2.1 Login/Sign-Up Page Redesign**

#### **2.1.1 Ticket Objective**

The objective of this ticket is to improve the user experience of logging in and signing up for all users of the ASSISTments online learning platform. This takes shape through making improvements to the visual design and clarity of the page. Figure 1 shows the original login/sign-up page.





*Figure 1: Original Login Page Design*

## 2.1.2 Methods

### Clarity

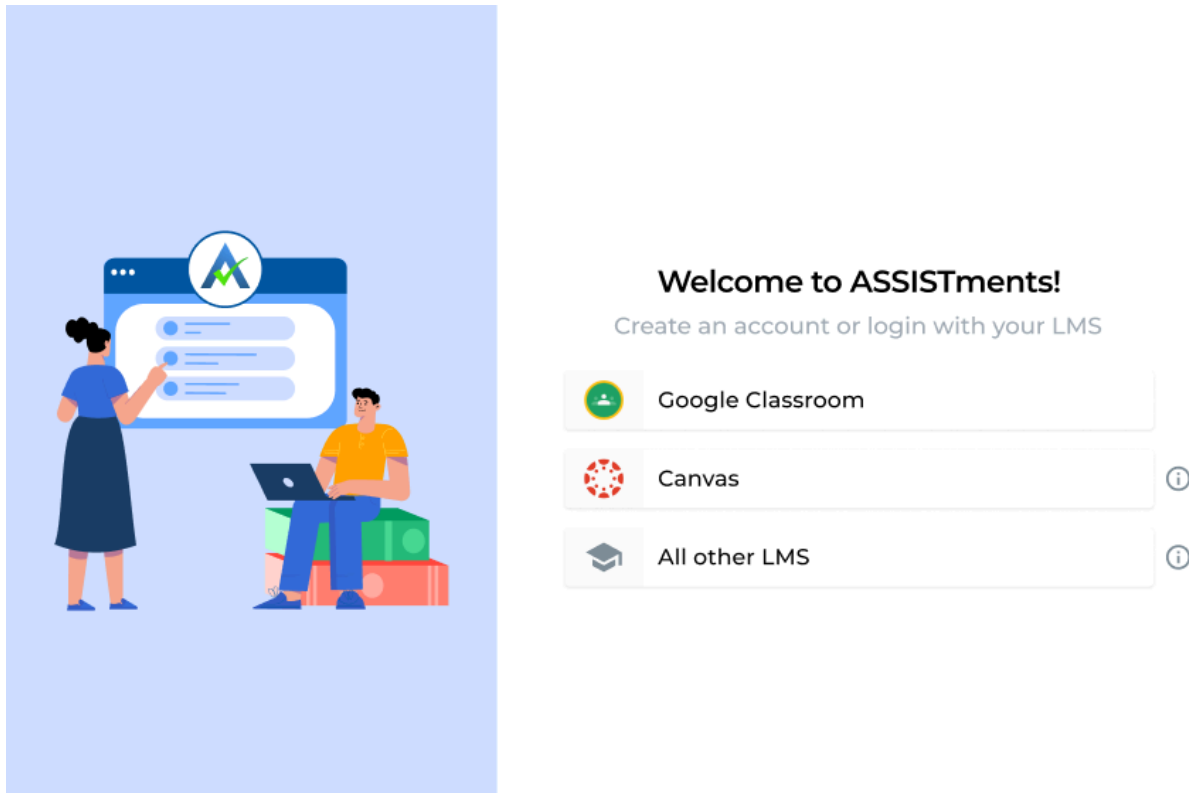
The current user flow brings new users who are signing up for an account and returning users who are logging in to an account to the same screen. This user flow is unavoidable, but can create a confusing and unwelcoming experience for new users. As seen in Figure 1, the current screen is not descriptive enough.

### Visual Design

The current design shown in Figure 1 lacks excitement and something to draw users in. Throughout the ASSISTments platform, illustrations are used to create a more welcoming experience.

### 2.1.3 Results

In the new login page design, shown in Figure 2, users are greeted with a brand compliant illustration of two characters using the ASSISTments platform. The design features a message that welcomes users to the platform and concise directions for creating an account and logging in with a learning management system (LMS).



*Figure 2: New Login Page Design*

## 2.2 Link Migration Pop-Up

### 2.2.1 Ticket Objective

The objective of this ticket is to ease the transition of the ASSISTments content migration for users using outdated links on the platform. This takes shape by designing a pop-up that alerts users that they have used an outdated URL and should note the new URL as the old one is being discontinued. Due to the content migration, many links to problem sets and folders that users

access will break and be discontinued after the migration. A pop-up alert is necessary to redirect users to the new working link where the problem set or folder can be found after migration.

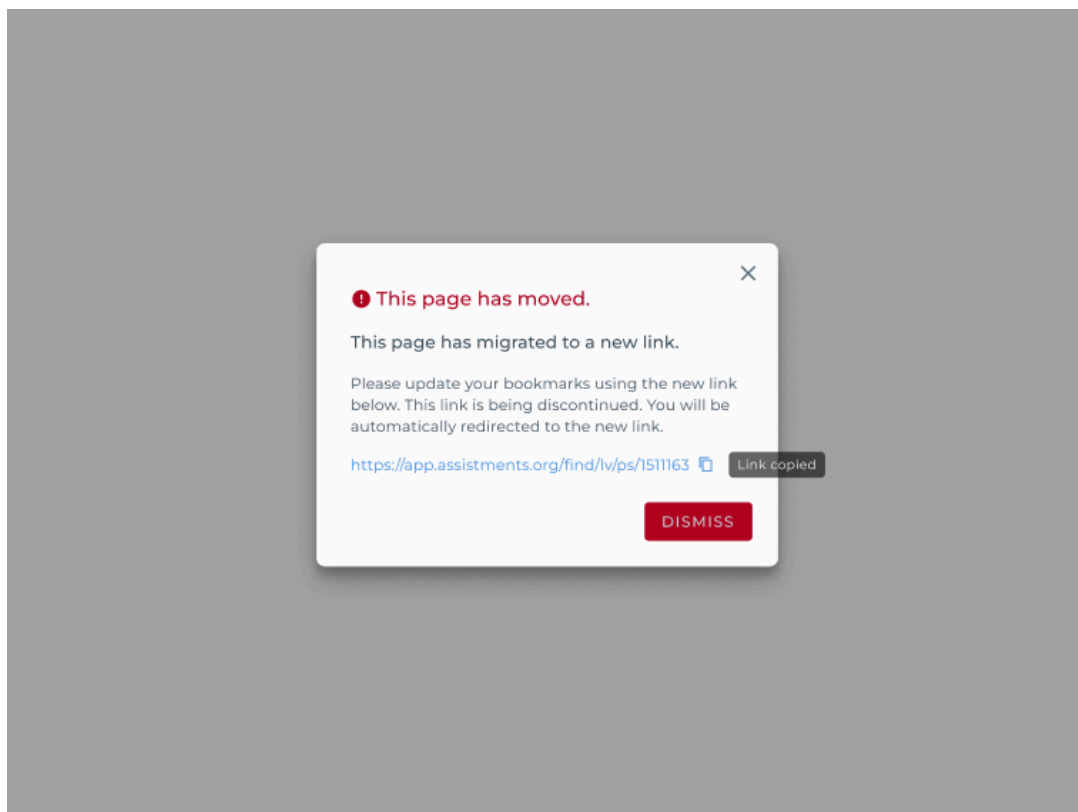
## 2.2.2 Methods

### Clarity

Text shown on the pop-up needs to be concise and clear to decrease cognitive load on users. The message should be direct to prevent any confusion.

## 2.2.3 Results

The link migration pop-up design, as seen in Figure 3, features a short and bold header that effectively communicates the issue. Below the header, a short description of the issue and directions on what the user should do are provided. A link of the new URL that users should use is presented as a button that they can easily click and copy.

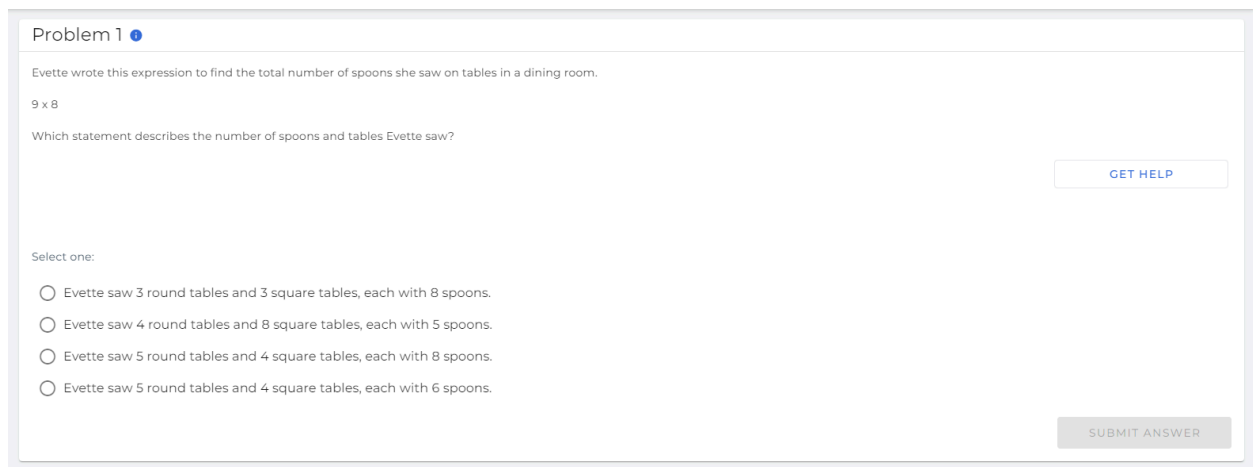


*Figure 3: Link Migration Pop-Up Design*

## 2.3 Rearranging Problem Body Elements

### 2.3.1 Ticket Objective

The objective of this ticket is to reorganize elements in the problem body for the student experience. Figure 4 shows the original design of the problem body. In the original design, student support and hint elements appear above the problem body and show work elements. The new designs will rearrange these elements so that student support and hints appear below the problem body and show work elements instead.



The screenshot shows a problem interface titled "Problem 1". The text reads: "Evette wrote this expression to find the total number of spoons she saw on tables in a dining room.  $9 \times 8$  Which statement describes the number of spoons and tables Evette saw?" Below this is a "Select one:" section with four radio button options: "Evette saw 3 round tables and 3 square tables, each with 8 spoons.", "Evette saw 4 round tables and 8 square tables, each with 5 spoons.", "Evette saw 5 round tables and 4 square tables, each with 8 spoons.", and "Evette saw 5 round tables and 4 square tables, each with 6 spoons." There are "GET HELP" and "SUBMIT ANSWER" buttons on the right side.

*Figure 4: Original Problem Body Design*

### 2.3.2 Methods

#### Designing for Different Problem Body States

The problem body has different elements depending on the state it's in. For every different state, a design was needed to show how the elements would be arranged.

### 2.3.3 Results

Figure 5 shows the new design with the rearranged elements for all the different states of the problem body. In the new design, the student support and hints appear below all of the other elements in the problem body.

ASSTments Cindy Starks


20.3: Finding Data Missing from the mean (DOK2)

- Problem 1: Part A  
The diagonal of a rectangle is show...
- Problem 1: Part B**  
The diagonal of a rectangle is show...
- Problem 2
- Problem 3
- Problem 4
- Problem 5

LEAVE ASSIGNMENT

**Problem 1: Part B**

The diagonal of a rectangle is shown.



Decompose the rectangle along the diagonal, and recompose the two pieces to make a different shape.

How does the area of this new shape compare to the area of the original rectangle?

Copied for New from openupresources.org

Select one:

- A The new shape has a lesser area than the original rectangle
- B The new shape has a lesser area than the original rectangle
- C The new shape has a lesser area than the original rectangle

SHOW WORK

GET HELP SUBMIT ANSWER

PREVIOUS PROBLEM NEXT PROBLEM

ASSTments Cindy Starks

20.3: Finding Data Missing from the mean (DOK2)

- Problem 1: Part A  
The diagonal of a rectangle is show...
- Problem 1: Part B**  
The diagonal of a rectangle is show...
- Problem 2
- Problem 3
- Problem 4
- Problem 5

LEAVE ASSIGNMENT

**Problem 1: Part B**

The diagonal of a rectangle is shown.



Decompose the rectangle along the diagonal, and recompose the two pieces to make a different shape.

How does the area of this new shape compare to the area of the original rectangle?

Copied for New from openupresources.org

Select one:

- A The new shape has a lesser area than the original rectangle
- B The new shape has a lesser area than the original rectangle
- C The new shape has a lesser area than the original rectangle

**Your work**

Simplify  $6x + 4x + 10$

$6x + 4x = 10x$

$10x + 10$

$10(x + 1)$

EDIT REMOVE

GET HELP SUBMIT ANSWER

PREVIOUS PROBLEM NEXT PROBLEM

ASSTments Cindy Starks


20.3: Finding Data Missing from the mean (DOK2)

- Problem 1: Part A  
The diagonal of a rectangle is show...
- Problem 1: Part B**  
The diagonal of a rectangle is show...
- Problem 2
- Problem 3
- Problem 4
- Problem 5

LEAVE ASSIGNMENT

**Problem 1: Part B**

The diagonal of a rectangle is shown.



Decompose the rectangle along the diagonal, and recompose the two pieces to make a different shape.

How does the area of this new shape compare to the area of the original rectangle?

Copied for New from openupresources.org

Select one:

- A The new shape has a lesser area than the original rectangle
- B The new shape has a lesser area than the original rectangle
- C The new shape has a lesser area than the original rectangle

SHOW WORK

**Hint**  
The shape will not be the same size

GET HELP SUBMIT ANSWER

PREVIOUS PROBLEM NEXT PROBLEM

ASSTments Cindy Starks


20.3: Finding Data Missing from the mean (DOK2)

- Problem 1: Part A  
The diagonal of a rectangle is show...
- Problem 1: Part B**  
The diagonal of a rectangle is show...
- Problem 2
- Problem 3
- Problem 4
- Problem 5

LEAVE ASSIGNMENT

**Problem 1: Part B**

The diagonal of a rectangle is shown.



Decompose the rectangle along the diagonal, and recompose the two pieces to make a different shape.

How does the area of this new shape compare to the area of the original rectangle?

Copied for New from openupresources.org

Select one:

- A The new shape has a lesser area than the original rectangle
- B The new shape has a lesser area than the original rectangle
- C The new shape has a lesser area than the original rectangle

**Your work**

Simplify  $6x + 4x + 10$

$6x + 4x = 10x$

$10x + 10$

$10(x + 1)$

EDIT REMOVE

**Hint**  
The shape will not be the same size

GET HELP SUBMIT ANSWER

PREVIOUS PROBLEM NEXT PROBLEM

Multiple Choice - default

ASSET Hunt Cindy Starks

20.3: Finding Data Missing from the mean (DOK2)

Problem 1: Part A  
The diagonal of a rectangle is shown...

**Problem 1: Part B**  
The diagonal of a rectangle is shown...

Problem 2

Problem 4


Problem 5

LEAVE ASSIGNMENT

---

**Problem 1: Part B**

The diagonal of a rectangle is shown.



Decompose the rectangle along the diagonal, and recompose the two pieces to make a different shape.

How does the area of this new shape compare to the area of the original rectangle?

Copy for free from [openupresources.org](https://openupresources.org)

Select one:

- The new shape has a lesser area than the original rectangle
- The new shape has a lesser area than the original rectangle
- The new shape has a lesser area than the original rectangle

**Your work**

Simplify  $6x + 4x = 10x$

$6x + 4x = 10x$

$10x = 10$

$10x = 10$

EDIT REMOVE

**HINT**  
The shape will not be the same size

**HINT**  
The shape will not be the same size

**Answer**  
The new shape has a lesser area than the original rectangle

**Correct Answer**

GET HELP

PREVIOUS PROBLEM NEXT PROBLEM

Figure 5: New Problem Body Designs

## CHAPTER 3. Mastery Visualization for the Student Experience

### 3.1 Background

#### 3.1.1 Knowledge Tracing

Knowledge Tracing (KT) is the practice of modeling and estimating a student's knowledge or mastery of a skill as they interact with coursework (Corbett et al., 1994). KT models can enable online learning platforms to personalize content to students and provide educators and researchers with data-driven insights of students' performance. A research team at ASSISTments developed and implemented a KT service for the ASSISTments learning platform. Using data from ASSISTments practice logs, the team compared two different KT models for use in the service, a Bayesian Knowledge Tracing (BKT) model and a Performance Factors Analysis (PFA) model. Their work discovered that using a BKT model was more optimal in predicting student performance. Using the BKT model, they developed a minimum viable product of the KT service that tracks student mastery in real time (Lyu, 2022). By integrating the service into the learning platform experience, ASSISTments can provide enhanced data-driven, customized learning.

#### 3.1.2 Bayesian Knowledge Tracing Model

There are four parameters used in the BKT model for the service. The first parameter is  $p(L_0)$  or  $p - init$ , the probability of the student knowing the skill beforehand. The second parameter is  $p(T)$  or  $p - transit$ , the probability of the student demonstrating knowledge of the skill after an opportunity to apply it. The third parameter is  $p(S)$  or  $p - slip$ , the probability the student makes a mistake when applying a known skill. The fourth parameter is  $p(G)$  or  $p - guess$ , the probability that the student correctly applies an unknown skill (has a lucky guess) (Yudelson et al., 2013). These parameters are used in the formulas shown in Figure 6.

Equation (a):

$$p(L_1)_u^k = p(L_0)^k$$

Equation (b):

$$p(L_t | obs = correct)_u^k = \frac{p(L_t)_u^k \cdot (1 - p(S)^k)}{p(L_t)_u^k \cdot (1 - p(S)^k) + (1 - p(L_t)_u^k) \cdot p(G)^k}$$

Equation (c):

$$p(L_t | obs = wrong)_u^k = \frac{p(L_t)_u^k \cdot p(S)^k}{p(L_t)_u^k \cdot p(S)^k + (1 - p(L_t)_u^k) \cdot (1 - p(G)^k)}$$

Equation (d):

$$p(L_{t+1})_u^k = p(L_t | obs)_u^k + (1 - p(L_t | obs)_u^k) \cdot p(T)^k$$

Equation (e):

$$p(C_{t+1})_u^k = p(L_{t+1})_u^k \cdot (1 - p(S)^k) + (1 - p(L_{t+1})_u^k) \cdot p(G)^k$$

*Figure 6: Bayesian Knowledge Tracing (BKT) Equations (Yudelson et al., 2013).*

The formulas are used as follows: the initial probability of a student  $u$  mastering skill  $k$  is set to the p-init parameter for that skill equation. Depending on whether the student  $u$  learns and applies skill  $k$  correctly or incorrectly, the conditional probability is computed by using equation (b) for correct application, or by using equation (c) for incorrect application. The conditional probability is used to update the probability of skill mastery calculated by equation (d). To figure out the probability of the student correctly applying the skill on a future practice is calculated with equation (e) (Yudelson et al., 2013).

With these equations, the model produces an output between 0 and 1 as a measurement for a student's mastery of a skill. An output of .9-1 indicates mastery, .6-.9 is near mastery, and .6 or below is below mastery (Lyu, 2022).



## 3.2 Methods

### 3.2.1 Project Objectives

The objective of this project is to integrate the KT service into the student experience and visualize mastery data from the service in a valuable way for students. This involves the addition of a mastery visualization feature to the assignment landing page and detailed report page in the student experience of the ASSISTments learning platform.

### 3.2.2 Designing to Motivate Students

A primary goal in the design of the mastery visualization feature is to ensure that it motivates students to strive for mastery improvement. In a meeting with Professor Stacy Shaw, whose research focuses on the psychology of learning and teaching in mathematics, we discussed and explored the best approaches to presenting mastery data in a motivating way. This section will describe the main principles of designing to motivate based on the insights given by Professor Stacy Shaw.

#### Use Motivating Language

Instead of displaying mastery data numerically, categorizing the data into simple but thoughtful tiers can be more interpretable by students. Rather than stating that they are below a certain level of mastery of a standard, phrasing it as incomplete mastery can be more motivating for students to progress.

#### Provide Visuals

Along with using language to encourage students to progress in their mastery, visualizing that progress can be a motivating factor as well. Displaying mastery with a visual aid or chart, like a progress bar, can illustrate that students are making progress towards mastery. By setting the progress bar above 0 and omitting visualization of decrease in mastery, students may be encouraged to maintain momentum.

## Promote Opportunity

Reward contingency can strip away the intrinsic motivation of students. Students won't attempt to improve their mastery for enjoyment or out of their own volition if there is a reward associated with it. Students like to see opportunities to take action and improve their performance. Instead of merely presenting the mastery data, linking them directly to avenues to improve their performance can be beneficial.

## 3.3 Results

### 3.3.1 Assignment Landing Page Design

The assignment landing page is a page presented to students when they start, stop or resume an assignment. This page provides valuable metrics and charts on a student's progress of an assignment, including the completion status and score breakdown as shown in Figure 7. The goal for changing this page design is to add a useful overview of the standards in the assignment and the student's mastery of the standards.

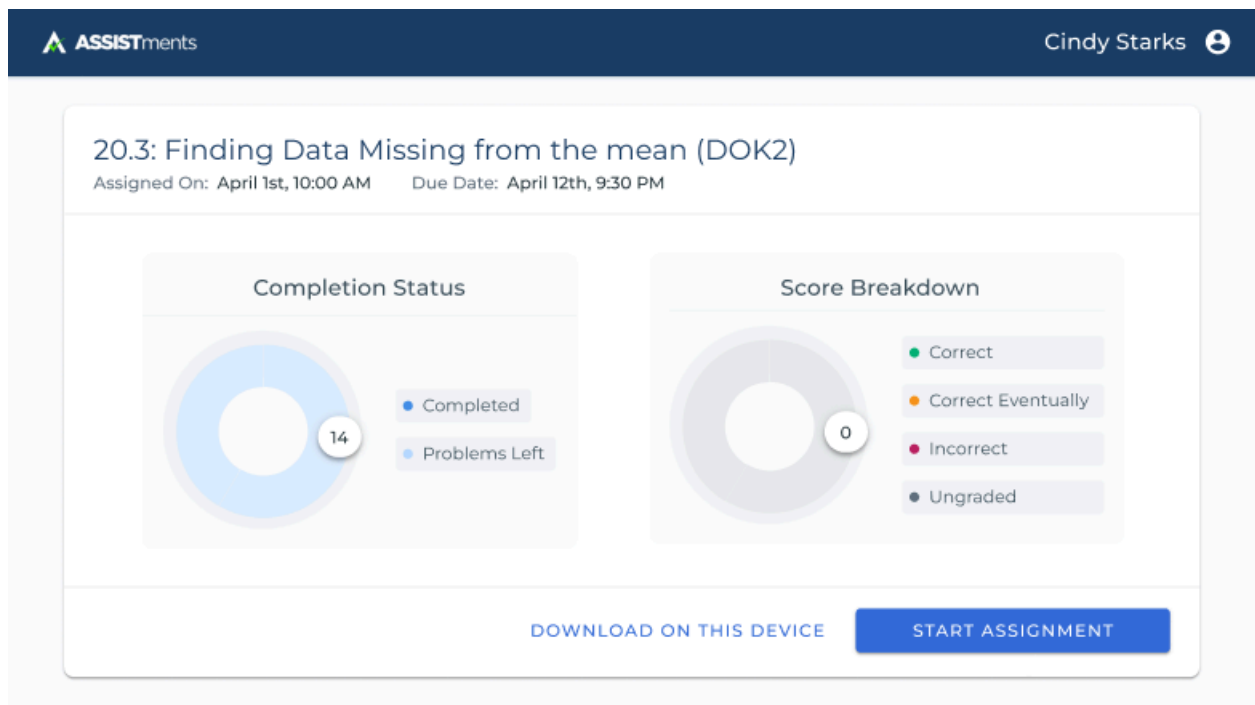


Figure 7: Original Assignment Landing Page Design

In the new design, a section is added for the mastery data visualization. As seen in Figure 8, students are provided with a vertical list of all the standards in the assignment and a progress bar to show their mastery progress. The progress bar is divided into three tiers; partial mastery, near mastery and exceeds mastery. The progress bar starts at 1 instead of 0 to provide momentum for students.

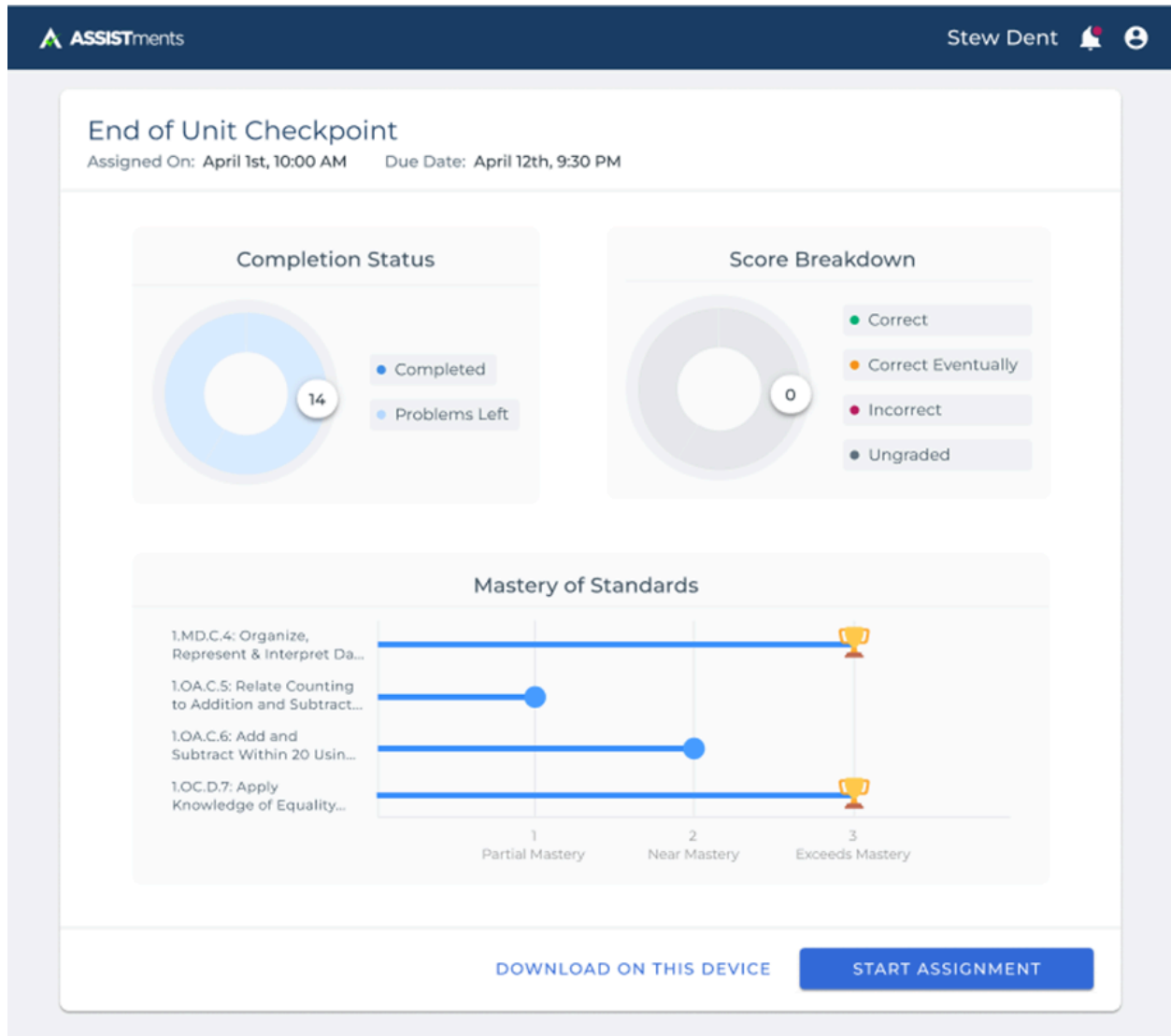


Figure 8: New Assignment Landing Page Design

### 3.3.2 Assignment Detailed Report Design

The assignment detailed report page is a page presented to students when they finish an assignment. As seen in Figure 9, this page provides extra details about individual problems in the

assignment such as score, class average and hint usage. The goal for changing this page design is to add a useful overview of the standards in the assignment and the student’s mastery of the standards. Along with an overview, this page would connect students to opportunities to improve standards that they struggled on.

Problem	Score ↓	Class Average	Hint Usage
Problem 1: Part A	100	90%	0
Problem 1: Part B	66	90%	0
Problem 1: Part C	33	90%	0
Problem 2	67	90%	0
Problem 3	100	90%	0
Problem 4: Part A	100	90%	0
Problem 4: Part B	0	90%	0

*Figure 9: Original Assignment Detailed Report Page Design*

In the new design, the detailed report page is split into two tabs that students can navigate between. The original detailed assignment report can be viewed in the detailed report tab. If a student switches to the mastery tab, they can view an overview of their mastery of the standards in the assignment as seen in Figure 10. Students can click on individual standard names to expand a side panel that reveals more information about the standard and a button to navigate to a problem set to problems of that standard for supplemental practice.

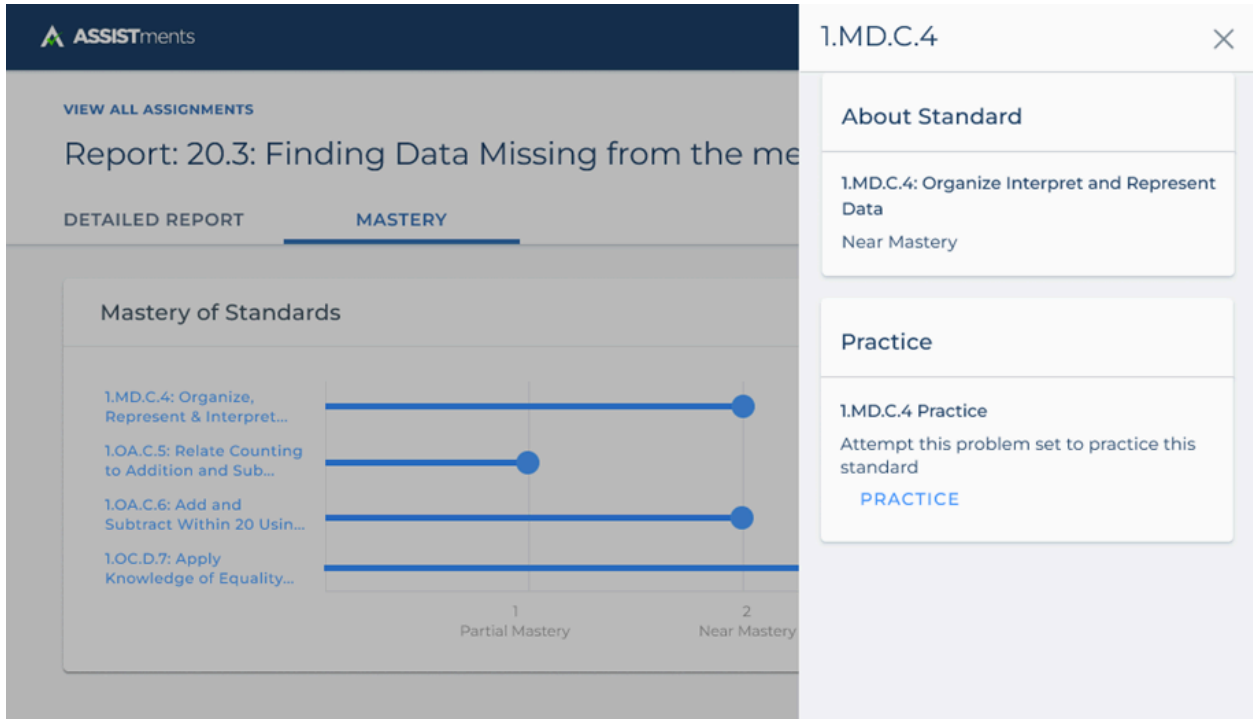


Figure 10: New Assignment Detailed Report Page Design

### 3.4 Future Work

Due to time constraints and lack of access to student users, I was unable to conduct user testing to evaluate the effectiveness of the designs. The ideal next steps for this project would be to conduct user testing and gain feedback to further improve and iterate on the designs.

## **CHAPTER 4. Adaptive Assignments Discovery**

### **4.1 Background**

#### **4.1.1 Adaptive Assignments**

As the ASSISTments platform allows for more personalized learning, adaptive assignments that center around students' pain points are needed. The preliminary idea for adaptive assignments is to aid teachers in identifying areas where their students need more practice based on previous coursework and create assignments that help further a student's learning in those specific areas.

#### **4.1.2 Similar but Not the Same Groupings**

Within ASSISTments, problems will have Similar but Not the Same (SNS) problems associated with each of them. Problems of the same SNS groupings will have the same format or wording but with different numbers or values changed out. SNS problem groupings can be utilized to enable individualized learning. If a student is struggling with a certain problem, ASSISTments can present them with SNS problems to practice to ensure that they gain proficiency on that specific problem grouping.

### **4.2 Methods**

#### **4.2.1 Project Objectives**

The objective of this project is to better envision and clarify what the experience of adaptive assignments will look like for both teachers and students. This involves discovery work through creating storyboards based on a series of discussions with Professor Neil Heffernan.

### **4.3 Results**

#### **4.3.1 Teacher Experience Storyboards**

Figure 11 illustrates and details the envisioned teacher experience for enabling and assigning adaptive assignments. Teachers would be able to enable and disable adaptive assignments for

students. Teachers could also customize when the adaptive assignment is shown in the student experience, as well as various customizations like a time limit, attempt minimum, completion count and test out count. The time limit would set a maximum amount of time allowed to complete the adaptive assignment. An attempt minimum would set a minimum number of attempts on a problem before a student can give up. A completion count would set the number of problems a student must answer correctly in a row to complete the adaptive assignment. A test out count would allow a student to complete an adaptive assignment by getting a certain amount of problems correct in a row. These customizations would be preset to reasonable default values that the teacher can change.

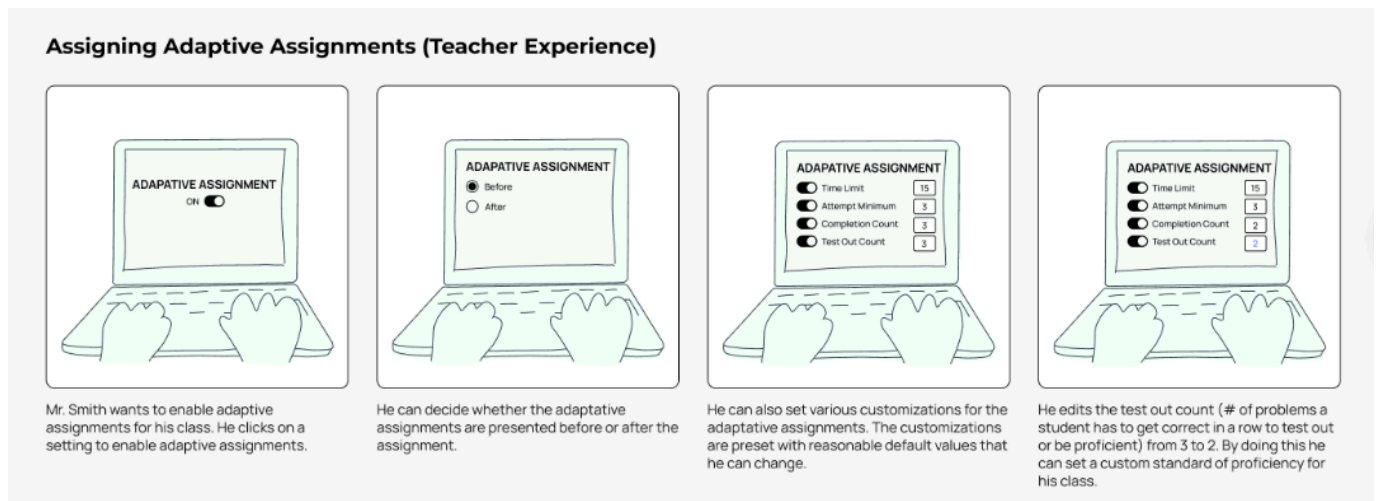
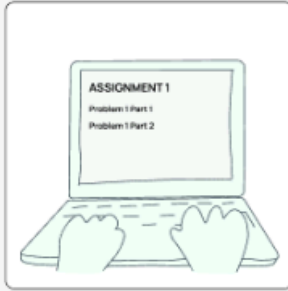


Figure 11: Adaptive Assignment Storyboards for Teacher Experience

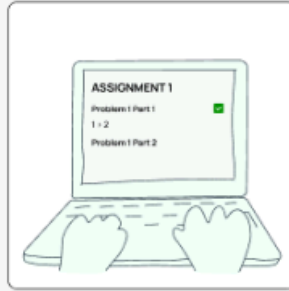
### 4.3.2 Student Experience Storyboards

Figure 12 illustrates and details the envisioned student experience for completing adaptive assignments. If a student is struggling with a specific problem in an assignment, ASSISTments would take account of that and create an adaptive assignment that consists of SNS problems for that problem for the student to complete within 48 hours. If the student completes that adaptive assignment, they would earn full credit on their initial assignment.

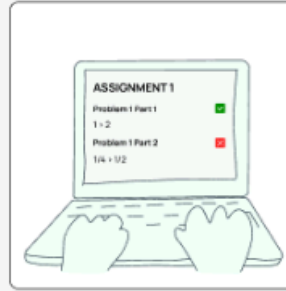
## Completing Adaptive Assignment (Student Experience)



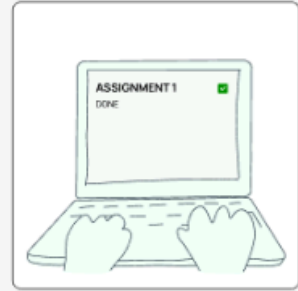
Serena is working on her homework assignment for today. The last problem of the assignment is a multi-part problem that focuses on comparing numbers.



She gets part 1 of the problem correct which consists of comparing two whole numbers.



However, she gets part 2 of the problem wrong which consists of comparing two fractions.



After completing that problem, she completes her assignment for today and logs off of ASSISTments.



Serena logs on to ASSISTments to complete the assignment her teacher assigned to her class today. Before she starts that assignment, ASSISTments has asked her if she wants to complete an adaptive assignment that consists of a few problems to master some skills she has missed in order to get full credit on her previous assignment.

### Notes:

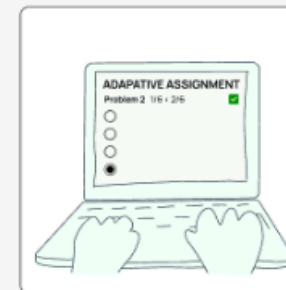
- SNS groupings shown in adaptive assignments are from MAX 2 day ago. Students have 48 hours to complete adaptive assignment to get full credit and achieve proficiency.



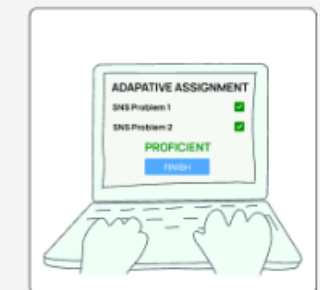
In her adaptive assignment, CAIT has given her a problem that practices comparing two fractions. She gets the problem correct.

### Notes:

- Problems in adaptive assignment are only of the SNS groupings student struggled with



CAIT gives her another problem that practices comparing two fractions. She gets this problem correct too.



Serena has got two problems of the SNS grouping correct in a row. She has shown proficiency in the SNS grouping and has received full credit on her assignment from the day before.

### Questions:

- If there are multiple SNS groupings in an adaptive assignment that a student hasn't mastered how do they show proficiency?
- For example, do they have to get two right in a row for every SNS grouping in the adaptive assignment to test out?



Serena can now work on the assignment her teacher has assigned to her class.

Figure 12: Adaptive Assignment Storyboards for Student Experience



## 4.4 Future Work

The discovery work for this project serves as a preliminary vision for adaptive assignments. The ideal next steps would be to interview teachers and students to further clarify adaptive assignments and ensure that they serve the needs of teachers and students. Using interview insights, these storyboards could be altered accordingly and user stories could be written and defined.

## **CHAPTER 5. Teacher Experience VPAT Testing**

### **5.1 Background**

#### **5.1.1 Voluntary Product Accessibility Template**

A Voluntary Product Accessibility Template (VPAT) is a document that helps evaluate how a product or technology conforms to IT accessibility standards outlined in Section 508 of the U.S. Rehabilitation Act (U.S. General Services Administration, 2024). Using this document, schools can gauge the accessibility of educational software prior to purchasing and adopting them. Schools can ensure that the software meets the accessibility needs of their educators and students and complies with accessibility standards. VPATs promote transparency and accountability among technology vendors, encouraging them to prioritize accessibility in their products (U.S. General Services Administration, 2024). Ensuring accessibility is essential to guarantee equal access to learning opportunities and success for all students, including those with disabilities.

#### **5.1.2 Web Content Accessibility Guidelines**

The Web Content Accessibility Guidelines (WCAG) is a set of guidelines created by the World Wide Web Consortium (W3C) to make web content more accessible for users with disabilities. WCAG is recognized as the international set of standards for web accessibility and is used as a basis in many accessibility policies and regulations, including Section 508 of the U.S. Rehabilitation Act (U.S. General Services Administration, 2024). Vendors can use WCAG criteria for evaluating and reporting on the accessibility of features in their product. VPATs frequently reference WCAG criteria when evaluating the accessibility of technology.

### **5.2 Methods**

#### **5.2.1 Teacher Experience VPAT Testing Plan**

The Teacher Experience VPAT Testing Plan was developed to address accessibility accommodations that teachers with disabilities may need when using the ASSISTments platform. The plan contains 20 use cases that describe actions a teacher may want to complete using the

platform. For every use case, there are smaller subtasks for completing the use case. There are a total of 29 subtasks among the use cases. Every subtask has 6 tests or criteria it must be completed in to pass as accessible. These tests include; completing the task with only a keyboard, a keyboard with a screen reader, a grayscale filter enabled, browser zoom set to 200%, browser zoom set to 400%, and the stylus extension set to a certain code. Figure 13 shows an example of one task in a use case with its tests in the testing plan document.

### Use Cases 1-3: Navigating “Find and Assign”

- Navigate and be able to access all parts of the “**Find and Assign**” landing page...
  - ...using only a keyboard Incomplete ▾
  - ...using a keyboard with a screen reader Incomplete ▾
  - ...with the grayscale filter enabled Incomplete ▾
  - ...with browser zoom set to 200% Incomplete ▾
  - ...with browser zoom set to 400% Incomplete ▾
  - ...with stylus extension set to [this code](#) Incomplete ▾

*Figure 13: Use Case in Teacher Experience VPAT Testing Plan*

## 5.2.2 Testing

For all 29 subtasks in the testing plan, I completed the following tests: completing the task with the grayscale filter enabled, with the browser zoom set to 200%, with the browser zoom set to 400% and with the stylus extension set to a certain code. For each of the tests completed, I included notes to document exactly how the platform didn’t pass the test.

## 5.3 Results

### 5.3.1 Grayscale Filter Enabled Test Results

For completing tasks with the grayscale filter enabled, 28/29 or 96% of the tasks could be completed. The one task that this testing criteria failed in was interpreting student reports, specifically the contents of the performance summary. The contrast of the colors used in the

performance summary graph were too low. As seen in Figure 14, the colors of the markers for “correct” and “correct eventually” are unable to be differentiated.



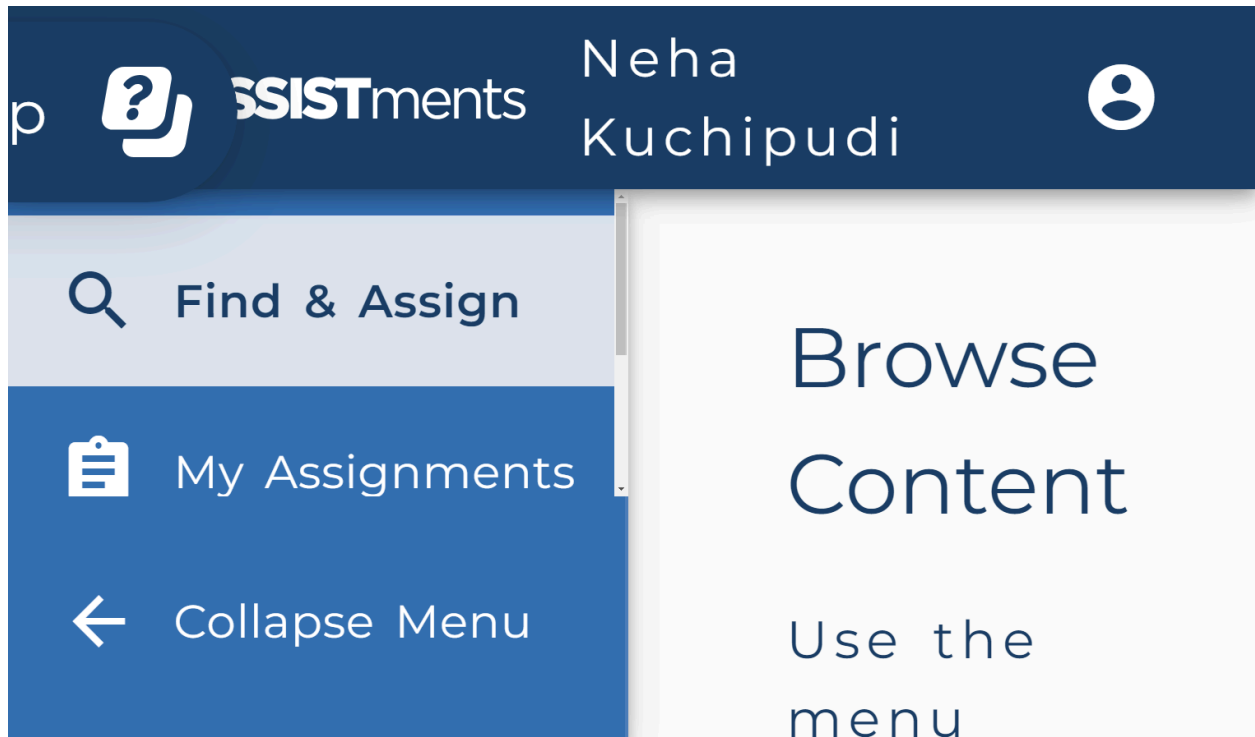
*Figure 14: Performance Summary Graph in Grayscale*

### 5.3.2 Browser Zoom Set to 200% Test Results

For completing tasks with the browser zoom set to 200%, 29/29 or 100% of the tasks could be completed.

### 5.3.3 Browser Zoom Set to 400% Test Results

For completing tasks with the browser zoom set to 400%, 15/29 or 51% of the tasks could be completed. The most common issue with this testing criteria was that elements of the page would overlap each other. As seen in Figure 15, the page header and side navigation cover so much of the content on a page making it so a user can essentially only read one line of text at a time. This clutter and overlap makes it impossible for a user to navigate or read content in a meaningful way.



*Figure 15: Find and Assign Page with Browser Zoom Set to 400%*

#### 5.3.4 Stylus Extension Set to a Certain Code Test Results

For completing tasks with the stylus extension set to a certain code, 25/29 or 86% of the tasks could be completed. The most common issue with this testing criteria was that the stylus extension code wouldn't actually apply to a page.

#### 5.4 Future Work

Based on the test results and notes documented, the next steps for ensuring accessibility in the teacher experience would be to edit designs or code for the pages that failed testing to solve the issues detailed. W3C provides recommendations and guidelines that can be followed and applied to the designs to remediate various accessibility issues.

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