Redesigning Sakai

Comp-441
Team Jaguar
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Project Participants

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Abstract

Students and faculty using Loyola's current learning management system, Sakai, persistently express their frustrations with it. Sakai's obscure "site" selection, the overload of nonessential information, the heavily laden list of options down the left-side of the screen, and so on all contribute to a sense of unease and confusion among its users. Hence, we wanted to design a reimagined Sakai interface that would provide a relaxing and minimalistic environment in which its users can organize the everyday chaos of their academic lives. There are many quirks in the current Sakai interface that inhibit users from efficiently navigating it, and we sought to remedy these features by placing the most pertinent desires of selected users—i.e. students, faculty, and staff—at the forefront of the user interaction. We envisioned each of these individuals logging into the application and immediately seeing a personalized news feed, tailored to their role in the university community, and an easily navigable list of four primary site functions with each classes' information embedded therein. From there, a user can quickly identify the item they wish to view—this could be their grades or an assignment for a class, etc. The user can then select the specific course they wish to view within the selected function. We feel this prioritizes the *function* that brought the user to the application over the necessity of entering the correct course ("site," as Sakai calls them). We all agreed that this is the biggest drawback of the current Sakai interface—a user will typically get lost or will be unable to remember the quickest way through the application because Sakai makes situating yourself within the app extremely difficult and the pathway is not easily identifiable. As we will demonstrate in this report, our Sakai redesign remedies this confusion by anticipating the needs of the user and constructs a clear path to meet the user's goals.

Narrative

Sakai as it Currently Exists: Our project group chose to work with the Sakai learning management system (LMS) used by Loyola. As Loyola students, our group identified Sakai as a software application we have all used and struggled with. Some of the major problems we have identified with Sakai are:

- A reliance on homogeneously-formatted lists for navigation, forcing the user to read through the list to navigate even the most basic site features.
- A disorganized user interface; for example the user's page is often filled with blank calendars, tutorials for other user roles (e.g. a video instructing faculty how to publish their courses on an undergraduate's Sakai site), or purposeless white space.
- Too many "places" in the main navigation, many of which are infrequently used.

Sakai as we Envision It: Our goals for the redesign of Sakai included:

- To simplify and clarify the main structure and navigation of the site, eliminating or combining existing navigation elements wherever possible.
- To streamline the user interface (especially during initial login process) to bring users the most relevant information (e.g. upcoming due dates) and avoid disseminating non-essential information (e.g. calendars with no events on them).
- To facilitate a user experience that is simple for beginners to learn while allowing experienced users to use the product with maximum efficiency.

The Competitive Landscape: We surveyed the following learning management systems when designing our revised Sakai interface: Canvas, Blackboard, and Google Classroom. For the most part these systems suffered from many of the same issues we observed in Sakai: primarily, a reliance on long lists of "places" that make it difficult for users to memorize or quickly recognize the places within the software application they use most frequently. While we recognize the opportunity for customization within the institutions' individual installations of these systems, across the board, we concluded the designs for all of these interfaces are laden with excessive features and sub-divisions of features that over-complicate the users' navigation of the LMS.
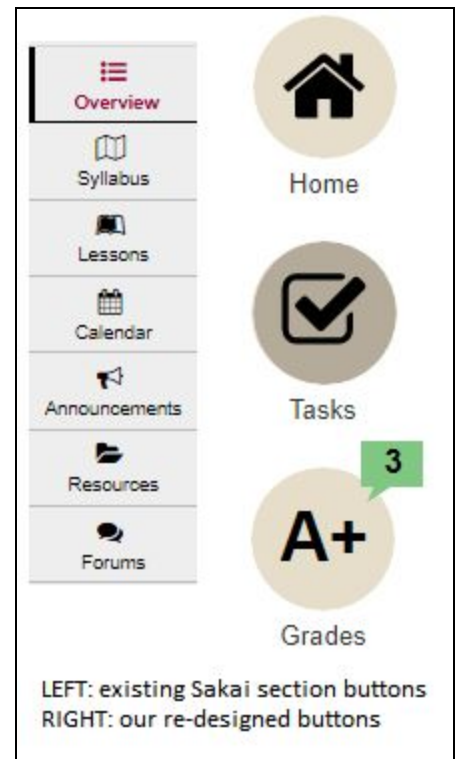
Design Considerations

Color: The existing Sakai platform has a maroon stripe across the top banner area, with the rest of the site rendered in gray and black buttons with maroon as an accent color. The background of the pages remains white, resulting in a great deal of white space. In our redesign, we wanted to use color more prominently to help the user recognize their current "place" in the site. At the same time, because accessibility is key in an educational setting, we don't want to rely upon
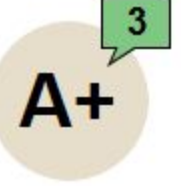
color as the sole method to recognize or navigate any part of the site. (*See Appendix B for a full assessment of our chosen color palette*).

Positive Highlighting and Focus: On the current Sakai site, section icons have gray backgrounds and black text and logos (see left row in image). When the user clicks one of these icons, the background remains gray and the text changes to the maroon accent color. We felt that the maroon and black are too similar and could be difficult to differentiate for users on certain monitors or with differences in visual perception. In our redesign, we opted for light beige icons with black text and logos. When selected, the button background changes to a dark taupe, highlighting the user's selection and place in the application. Also, in our redesign, buttons are discrete, enclosed circles, whereas in the existing Sakai the buttons are all in one long, connected row. Combined, these changes make it much easier for a user to identify the different sections of the site and determine which one is currently being accessed.

LEFT: existing Sakai section buttons
RIGHT: our re-designed buttons

User Interaction: On the current Sakai site, users must often scroll through a list of menu items to find the content they are looking for. As a user, this list is tedious to navigate and can be confusing (e.g. the existence of both an "email" and "messages" section). Our user testing using the KLM-GOMS model revealed long mental preparation times as users of the existing Sakai determined which actions to take in order to accomplish their user goals. We wanted to clarify and streamline the user interaction with Sakai by reducing the total number of section buttons and giving each button a bold, easily-recognized icon (with text labels, unless the user turns them off manually) so that users can more quickly determine which actions will lead to the successful completion of their current goal. Fitts's Law states that the time required to point at an object is a function of that object's distance (from where the pointer currently rests) and size. By increasing button size, therefore, we can reduce the time required to for the task of pointing the cursor at that button, and ultimately reduce the time it takes the user to complete their goal.

Mental Models and Recall: Our clear icons and labels reduce the cognitive load on the user. In the existing Sakai platform, ambiguous icons mean the user is required to read the labels each time (or eventually build up these associations with icon, see the table below).

Existing Sakai		Team Jaguar Redesign	
Function	**Icon**	**Function**	**Icon**
Overview	☰	Main page when user logs in, "user home"	🏠 (or click main Sakai icon when logged in)
Calendar	📅		
Lessons	📖	Tasks	☑
Assignments	📄		
Tests & Quizzes	☑		
Messages	📥	Connect	💬
Blogs	💬		
Forums	💬		
Wiki	📝		
Email	✉		
Syllabus	📖	Files	📁
Resources	📂		
Gradebook	📓	Grades	A+ 3

Reducing Cognitive Load and Increasing Flow: Our buttons are concisely labelled with bold, clear icons which should reduce user cognitive load by making icons easier to recognize and

reducing the user time and effort needed to switch tasks. As discussed above, positive highlighting is used to help the user orient themselves within the application at all times, increasing flow potential as the user is not required to devote nearly as much cognitive bandwidth to basic navigation within the application.

Gamification, Simulations, Tutorials, and Practice: Our redesign would include a "tutorial" or "wizard" mode for users logging in for the first time, or for the first time after a set period (e.g. user has not signed in for 4+ weeks), or after a major feature update. This would highlight the main parts of the user interface (top menu, side navigation menu, user settings) in a modal window and force users to acknowledge the modal before dismissing. Once dismissed, the mode would not re-appear unless requested by a user (by clicking "Help") or triggered in one of the above ways (time lapse, new features added).

Processing Visual Information: The web and mobile versions behave a bit differently in this regard. The web version follows a more traditional "F" pattern. The top banner is often ignored by users and this contains static buttons like the home button and settings button. Users should be able to usually ignore these elements, but placing them in the top banner means users will know where to find them since this placement is extremely common across a wide range of web applications. Continuing downward along the left side of the screen in the F pattern, users see our main site "places" in large, clear buttons (home, Tasks, Grades, Files, Connect). Once they access the desired "place" on Sakai, users are expected to utilize the Gutenberg Principle to read the content in the main center section of the page.

In the mobile version of our Sakai redesign, the primary change is that the main side navigation is placed inside a popup ("hamburger") menu, keeping these elements out of view unless the user needs to access them. The top banner elements are condensed compared to the web version, but retain their basic layout. Again, this allows users to find their "user home" page and common elements (like settings) at the top, as is common, while still easily allowing access to the navigation menu through the menu.

Gestalt Laws: We use the Law of Similarity with our menus: the top menu elements are all in a strip of color, so they can be easily recognized and found at any time. The side menu elements are all icons enclosed in circles of the same color, so it is clear that they form one coherent list of elements despite the space separating the individual circles. When selected, these buttons change to a darker color.

Consistency, Visibility, Affordance, Mapping, Feedback, and Constraints

Consistency: We designed our new Sakai interface around the web browser and Android mobile OS. There is some attempt to be externally consistent with the operating system (although we did not make a fully material design-compliant prototype). Other elements like the hamburger menu for the mobile app and the top "Sakai" icon leading back to the home page are consistent across other mobile and web apps, so our Sakai redesign is consistent with them. Internally, our web and mobile versions are consistent in having all of the same places and features, differing only in the way they present these elements on the screen (always visible side menu on web, pop-up menu on mobile).

Visibility: In our redesign, we felt it was important that all of the site's primary functions be visible from any part of the application. These functions include the Home, Tasks, Grades, Files, and Connect buttons grouped in a column down the left side of the screen. Options for customizable settings and searching are also visible from any page in the site, however their more interior functions are nested instead of outrightly visible at all times (i.e. the user would have to click the settings button to view the available customizable settings). In making our site's primary functions always visible we promote and facilitate the creation of user mental models and effective recall because the user never has to guess their way through the application.

Affordance: Using established standards (top banner with settings and search, main navigation on left side) encourages already-understood patterns of user interaction and signals to the users that these elements are interactive (e.g. click the gear icon to go to "settings," or the house to go "home"), encouraging and affording user interaction.

Mapping: All functions are retained from web to mobile version; the main difference is the left-hand nav menu on the web being moved into a slide-in menu for mobile. In terms of mapping existing Sakai features to our redesign, please see the table on page 5 for a complete breakdown of where existing Sakai functions live in the redesign.

Feedback: Activational feedback, though not always modelled in our prototype, is essential to helping users feel that the application is responsive. Activational feedback (such as buttons flashing when clicked) signal to the user that their input has been received. Behavioral feedback (like moving to a new page or sliding out the search bar) signals to the user that their selected action has resulted in a response from the application, moving them closer to their goal.

Constraints: Over the course of this project we recognized numerous constraints in our development process and on the final software requirements:

- Limiting project scope to redesigning Sakai with its primary purpose as a learning management system at the forefront; thus, choosing to scale back initial ideas represented in hand-drawn mockup to incorporate professional development and portfolio features
- Limiting project scope to the student role (vs faculty) due to our ability to only access the student-role of our current Sakai
- Building competence with mockup/prototyping software (NinjaMock and JustInMind) -- learning how to make the software properly reflect our design choices
- Final product must be accessible, usable by diverse members of academic community
- Final product must support the same essential features as the existing Sakai (grades, posting of class files/resources, and ability to post and turn in assignments had to be included, could not be removed as design decisions)
- Final product must not have certain other features that may be common or trendy in the social space due to academic privacy concerns (for example, a social widget allowing users to see their friends' progress on an assignment or compare class grades)

Robinson's Four Stages of Competence: In redesigning Sakai, we realized that various users of an LMS could fall into any of Robinson's Four Stages of Competence. To address these varying levels of user competence, we incorporated the following considerations into our design:

> **Unconscious Incompetence:** For users who are so new to Sakai that they are unaware how deficient their skill set is, we strived for a simple, uncluttered design that is easy to interpret for a novice user. We display only those announcements that are relevant to the user's role in the system, e.g., graduate student, undergraduate, faculty, etc. We also limited our primary menu to a small number of large, clear buttons, to avoid overwhelming the user. An additional feature that we would implement would be a "guided tour" of the system, introducing the user to the main features and functionality.

> **Conscious Incompetence:** For users who have grown familiar enough with Sakai that they realize there is much more yet for them to learn, we provide various features to help them increase their comfort level with the system. One of these features is an assistive search that would not only point users directly to the item for which they searched, but also advise them on the best way to find that item again through the existing menus. Also, to help users stay oriented as to their location within the system, we darken the button on the left-hand menu relative to the screen or section where they currently are. We also would ensure that the guided tour prepared for the Unconsciously Incompetent user would be available to re-run on demand for more advanced users, if needed.

Conscious Competence: Once users reach this stage and are aware that they have mastered much of the functionality in Sakai, we would encourage them to achieve further efficiencies in their interactions with the system. These strategies would include keyboard shortcuts for certain common tasks, which would eliminate the time, effort, and cognitive load spent on interacting with the system via the mouse; as well as frequently-used or recent-access cards, which the user could set as they wish (or the system could intelligently identify) and would allow the user to navigate to their most frequently used screens with even fewer mouse movements and clicks.

Unconscious Competence: Our goal, of course, is for all users to reach this stage as quickly as possible, in which they can interact the system with minimal (if any) conscious thought. To achieve this, we allow users to configure their personal preferences and settings, such as choosing which of their external social media or productivity accounts they wish to interface with Sakai. We chose icon graphics that are simple, easy to memorize, and clearly map to their associated functionality, in order to further reduce the user's cognitive load. We also want to prevent this user's flow from being broken by unexpected design or functionality changes that may come with system updates, so we would be sure to provide them with an informational popup upon login that would briefly alert them to these changes.

By implementing these design considerations, our intention is that all users will reach the state of Unconscious Competence. This is a goal that we believe is currently unachievable within the current version of Sakai due to its overly complicated layout and overwhelming number of disorganized menu options.

Interaction Concept and Style:
- Navigation icons are all brown circles, or on top of the brown header bar.
- Text-based links are all green/bold/underlined.
- Form elements (input boxes, submit buttons) adhere to traditional/accepted styling for web forms.

Information Architecture:
- We deliberately chose to organize information by task/action first, and then optional filtering by course, in order to match the user's mental pattern or, rather, their goals for using the application.
- "Task" vs "Assignment" — the former is more inclusive and can be attributed to a greater array of items.

- Our Sakai redesign has an Assistive-Search feature which helps users adjust to possible confusion in the renaming of traditional Sakai sites.
- Location awareness within the app: when selected, the buttons in the left hand menu change from a light beige to a dark taupe to signal to the user that they've changed location in the site.
- Notifying users within the application: When appropriate, a notification bubble appears next to buttons in the left-hand navigation bar to notify the user of a new grade or message from their instructor (e.g. in prototype we show "3 new items in Grades").

Design and Specification

Our first steps in redesigning Sakai (following a comprehensive survey of the current interface and of other learning management systems) began with a hand-drawn wireframe reflecting our initial ideas for the new Sakai landing page upon user login. In this initial wireframe (see appendix A image 1), we hashed out the basics of the redesign narrowing down the primary functions of the LMS to four distinct options to later be flushed out in more detail in our lo-fi mockup. This initial wireframe reflects several concepts of our design that we continued building upon in later iterations of mocking up our redesign: accessible/minimalist aesthetic, ability to connect external social/communication applications, streamlined navigations, and user personalized messaging. In our second design development stage, we used the online wireframing application called NinjaMock to create a lo-fi mockup of the redesigned splash page (as per the hand-drawn wireframe) as well as the ancillary pages for our four main LMS functions. In this lo-fi mockup (see appendix A images 2-7), we solidified the four feature functions (although changed the names and icons by our final design) and started considering how a user would navigate between these. A point of contrast with our final design, regarding navigation in particular, is the shifting home button. More consideration regarding the placement of the home button and the inclusion of a top navigation bar (containing a place for user's to specify profile settings or search the application) were implemented in our final design development. In our final development stages we decided to create a hi-fi prototype of our redesign using the JustInMind prototyping tool. The ability to create links between the various features allowed us to better represent our streamlined redesign of the site's navigation. Our hi-fi prototype is available here: http://bit.ly/2rdT330. Seeing our design in this more advanced prototyping environment helped us refine many of our design decisions especially with regards to navigation between site functions and the course filters within those functions. We also thought it was important to provide a peek at what the redesign would look like on a mobile device; therefore, we created a lo-fi mockup of the "Resources" page as seen on mobile. The lo-fi mobile mockup is available here: http://bit.ly/2w6p1CR. In the following section, we

provide greater detail into how our design continued to develop after user testing and presentation feedback.

Testing and Iterative Design

Color Schemes, Contrasts, and Color Blindness:
We went through a few different iterations of color schemes to try to find something that:
- Would not create accessibility issues for users with various types of color-blindness
- Had sufficient contrast to convey meaning without being garish or distracting.

To determine an accessible and soothing color palette we asked a colorblind individual to use our prototype and remark on anything that looked strange or tell us if there was anything on the page he was unable to see. He told us the colors we chose for the accent elements in the site contrasted well with the white background and he was able to differentiate between site features quickly and easily (see Appendix B for the hex codes for our chosen palette and a brief color blindness assessment). We had to increase the stroke weight for some of the smaller text because the individual claimed it appeared green instead of black, and we felt green text might be disorienting for a user to keep having to read on a webpage. Overall, however, the palette we chose translates well to the various types of color blindness and maintains a soothing and non-abrasive feel. In the customizable settings, there is an option to view the website with an accessible theme; while we feel our existing palette satisfies this need we wanted to provide our users with the option to invert the palette. When the setting is selected, the accent colors will switch from their original hues to their inverted color-companions determined by the color blindness simulator found [here](#).

Positive Highlighting and Focus:
Throughout the design process, we tossed around ideas for how we might signal to our users that their desired actions were completed. We chose a few specific elements to animate to convey the users' place in the application and any important information:
- The buttons in the left hand menu change color when pressed to signify the user's location within the system.
- Action confirmation popups (e.g., "this task has been added to iCal," "your settings have been saved") are placed directly over the action in question, i.e., in the user's fovea.
- Filtering options are placed prominently in the user's primary focus with regards to the calendar/gradebook.

Quantifying Cognitive Load, KLM-GOMS Analysis:
Performing a KLM-GOMS analysis of two primary tasks for users of Sakai—checking grades for a particular course and looking up assignment details—provides numerical evidence of the efficiency introduced in our more streamlined redesign. The current version of Sakai forces users

to choose a site/course before executing their desired action, which introduces added complexity and extra steps in order to achieve the task. Our redesign removes that step, allowing the user to navigate directly to the screen for their desired action, and then provides an easy method by which the user may filter the full list of grades or tasks by course, if they so choose. Reducing the number of mouse clicks, as well as the cognitive load of navigating these extra steps, increases user efficiency by approximately 33% for each task. Over the course of a single evening doing homework, not to mention over the course of a semester, these improvements add up significantly.

Checking Grades for a Particular Course (from home screen):

Sakai (Original)			Sakai (Redesign)		
Action	**Code**	**Time (sec)**	**Action**	**Code**	**Time (sec)**
Mental preparation to find "sites"	M	1.2	Mental preparation to find "Grades"	M	1.2
Point mouse to "sites" button	H+P	1.5	Point mouse to "Grades" icon	H+P	1.5
Click "sites" button	BB	0.2	Click "Grades" icon	BB	0.2
Mental preparation to find course	M	1.2	Mental preparation to filter by course	M	1.2
Point mouse to name of course	P	1.1	Point mouse to course checkbox	P	1.1
Click name of course	BB	0.2	Click course checkbox	BB	0.2
Mental preparation to find "gradebook"	M	1.2			
Point mouse to "gradebook" button	P	1.1			
Click "gradebook"	BB	0.2			

button					
TOTAL		**7.9**	**TOTAL**		**5.4**

Accessing a Task for a Particular Course (from home screen):

Sakai (Original)			Sakai (Redesign)		
Action	**Code**	**Time (sec)**	**Action**	**Code**	**Time (sec)**
Mental preparation to find "sites"	M	1.2	Mental preparation to find "Tasks"	M	1.2
Point mouse to "sites" button	H+P	1.5	Point mouse to "Tasks" icon	H+P	1.5
Click "sites" button	BB	0.2	Click "Tasks" icon	BB	0.2
Mental preparation to find course	M	1.2	Mental preparation to find task in calendar	M	1.2
Point mouse to name of course	P	1.1	Point mouse to task link in calendar	P	1.1
Click name of course	BB	0.2	Click task link	BB	0.2
Mental preparation to find "lessons"	M	1.2	Point mouse to task details link	P	1.1
Point mouse to "lessons" button	P	1.1	Click task details link	BB	0.2
Click "lessons" button	BB	0.2			
Mental preparation to	M	1.2			

|					
find desired task					
Point mouse to task link	P	1.1			
Click task link	BB	0.2			
TOTAL		**10.4**	**TOTAL**		**6.7**

Conclusion

Team Jaguar's Sakai redesign achieves the following objectives:

- From separate "sites" to one unified experience for all courses
  - The "sites" paradigm is gone
  - Simply log in and go right to your desired task

- From generic to personalized
  - No more videos for students about publishing their courses
  - Sakai uses your LUC ID, so it knows you and whether you are faculty, undergraduate student, graduate student, etc.
  - Upon logging in, users are greeted with announcements and information relevant to their role

- From 16+ navigation icons to 4
  - From a list of sections to large, clear buttons
  - Reduces cognitive load on user by:
    - no longer have to read through long list of sections to find the correct one
    - Positively highlighted, visible buttons make it easy for a user to determine which section they are currently in

- From perpetual-intermediacy to expertise
  - Existing Sakai is hard to master - who really feels competent in *every* feature it offers?
  - Simplicity of Team Jaguar redesign lets students devote cognitive energies to their studies instead of navigating their LMS
  - Simplicity, customizability, adaptive search are all designed to promote achievement of competence quickly and easily

Appendix A: Initial Design Mockups and Wireframes
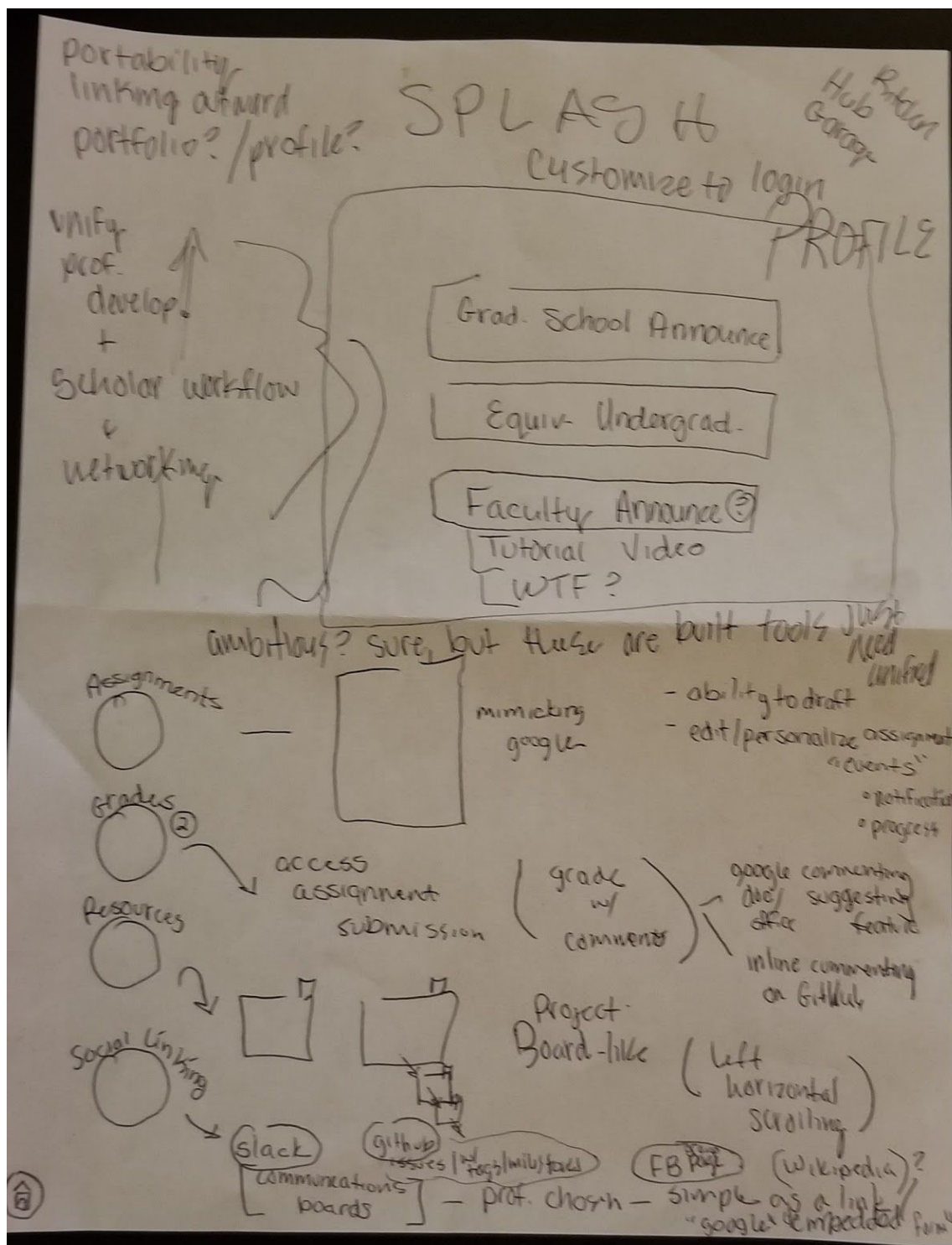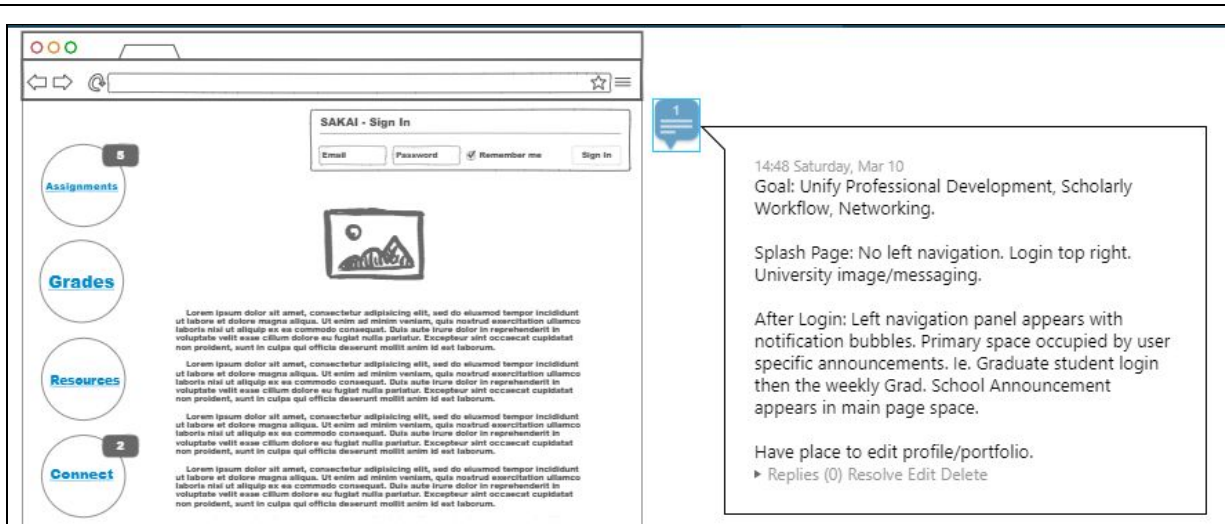
Initial Ninjamock design for the home/log-in page. Note the initial designs included integration with professional and scholarly tools, which were later dropped to focus on the core functions of learning management software.
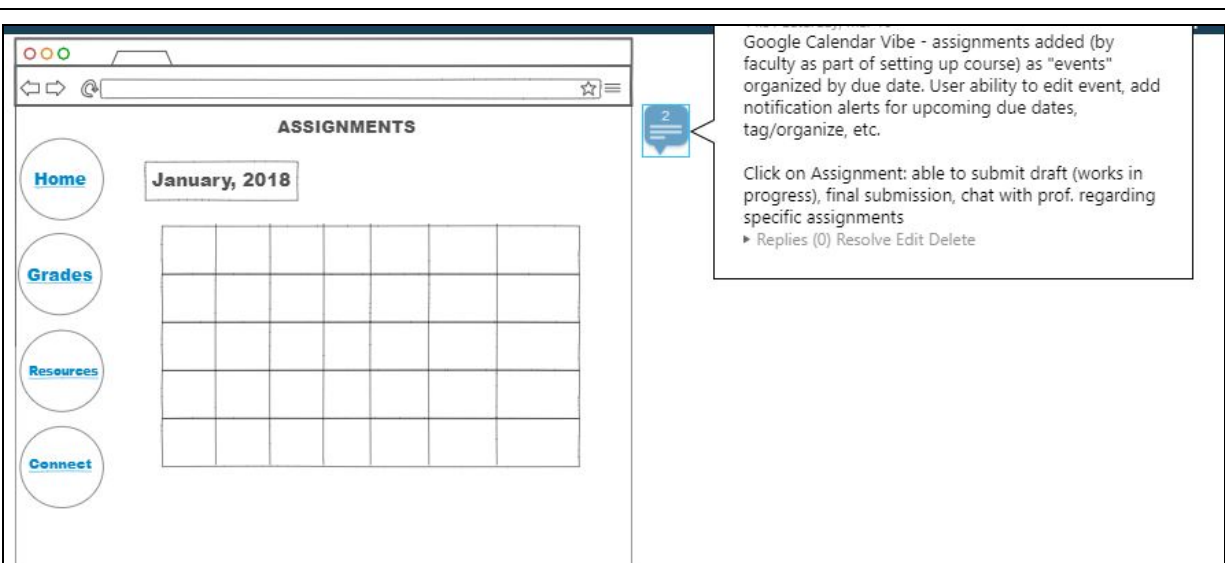
Initial ninjamock design for our assignments page, to later become "Tasks." This section was refined extensively, but in many ways the vision of this mockup remains intact in our final designs.
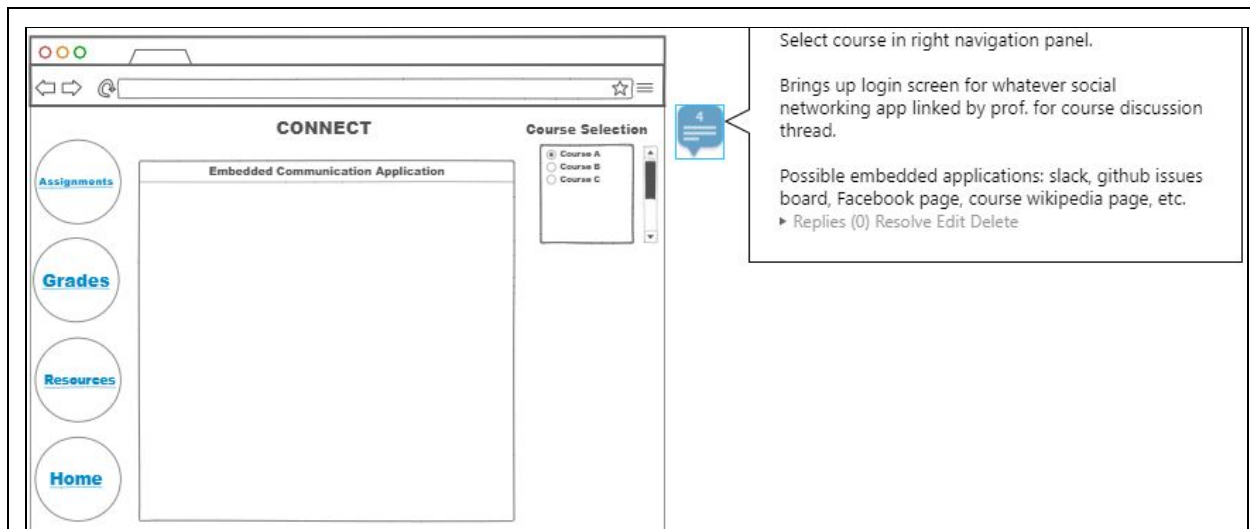
The initial ninjamock design for our Connect page. This design is mostly intact in our final designs.
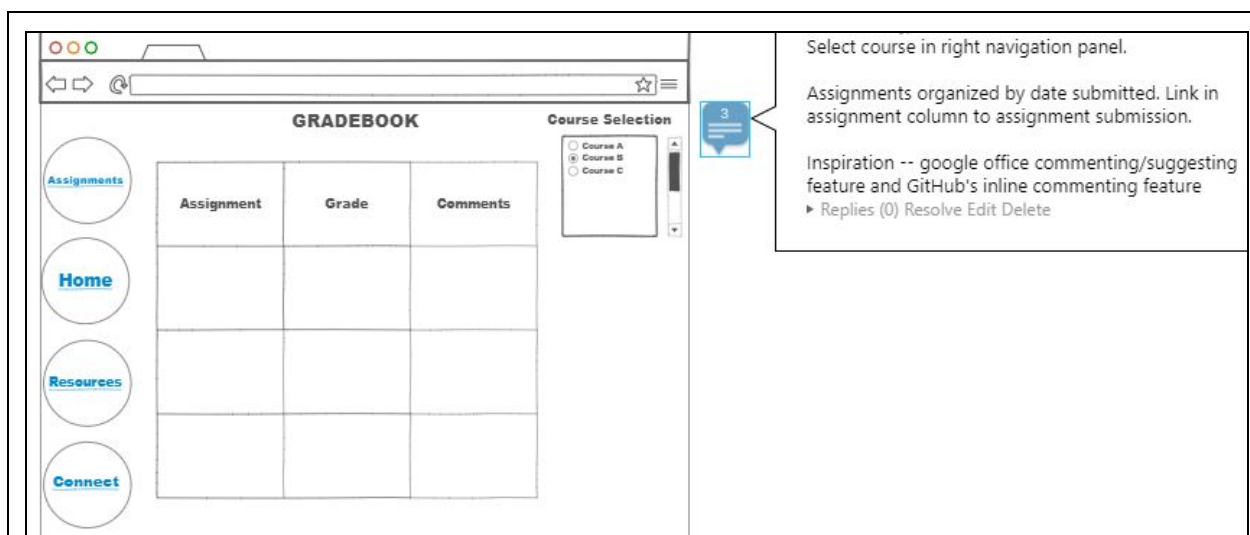
The initial Ninjamock design for our Gradebook page, to later become "Grades."

The initial Ninjamock design for our "Resources" page, to later become "Files." The layout of this mockup is very similar to our final design.

Appendix B: Red & Green Color Blindness Assessment

Color Blindness Simulator

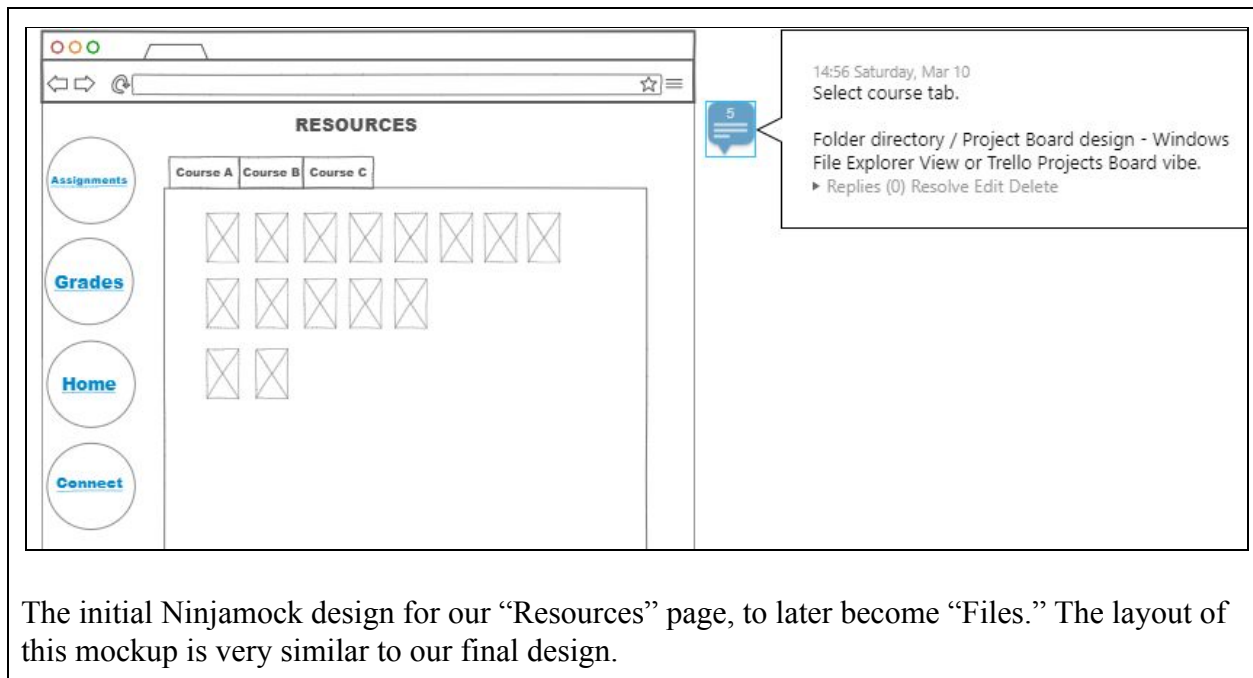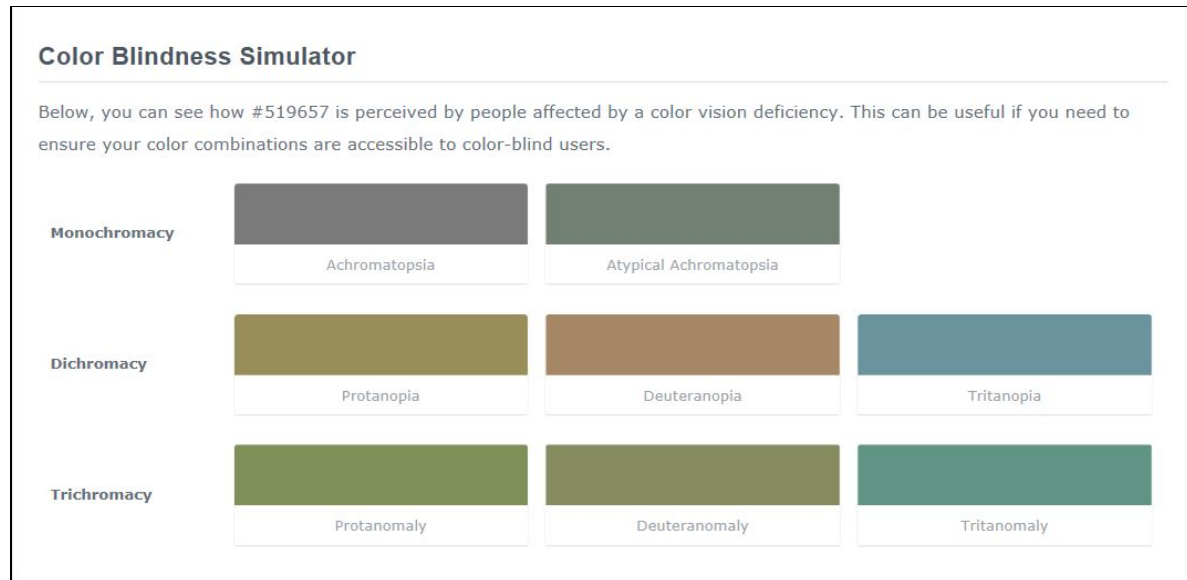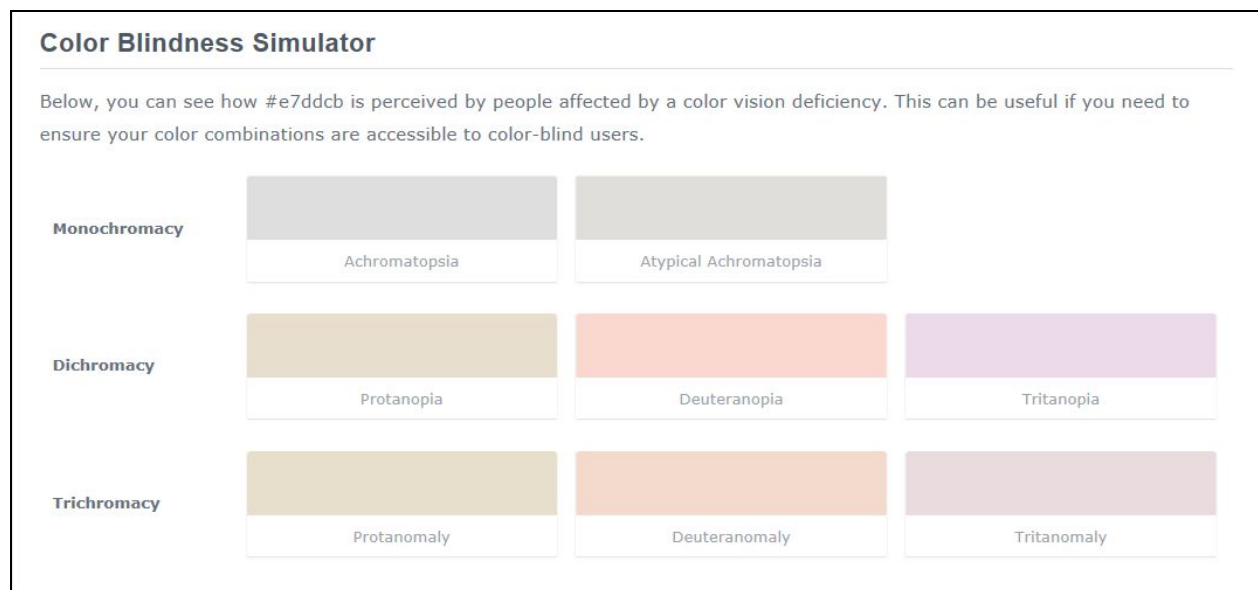Below, you can see how #519657 is perceived by people affected by a color vision deficiency. This can be useful if you need to ensure your color combinations are accessible to color-blind users.

Monochromacy	Achromatopsia	Atypical Achromatopsia	
Dichromacy	Protanopia	Deuteranopia	Tritanopia
Trichromacy	Protanomaly	Deuteranomaly	Tritanomaly

Original Color: hex #519657

Color Blindness Simulator

Below, you can see how #e7ddcb is perceived by people affected by a color vision deficiency. This can be useful if you need to ensure your color combinations are accessible to color-blind users.

Monochromacy	Achromatopsia	Atypical Achromatopsia	
Dichromacy	Protanopia	Deuteranopia	Tritanopia
Trichromacy	Protanomaly	Deuteranomaly	Tritanomaly

Original Color: hex #e7ddcb

Color Blindness Simulator

Below, you can see how #857c6c is perceived by people affected by a color vision deficiency. This can be useful if you need to ensure your color combinations are accessible to color-blind users.
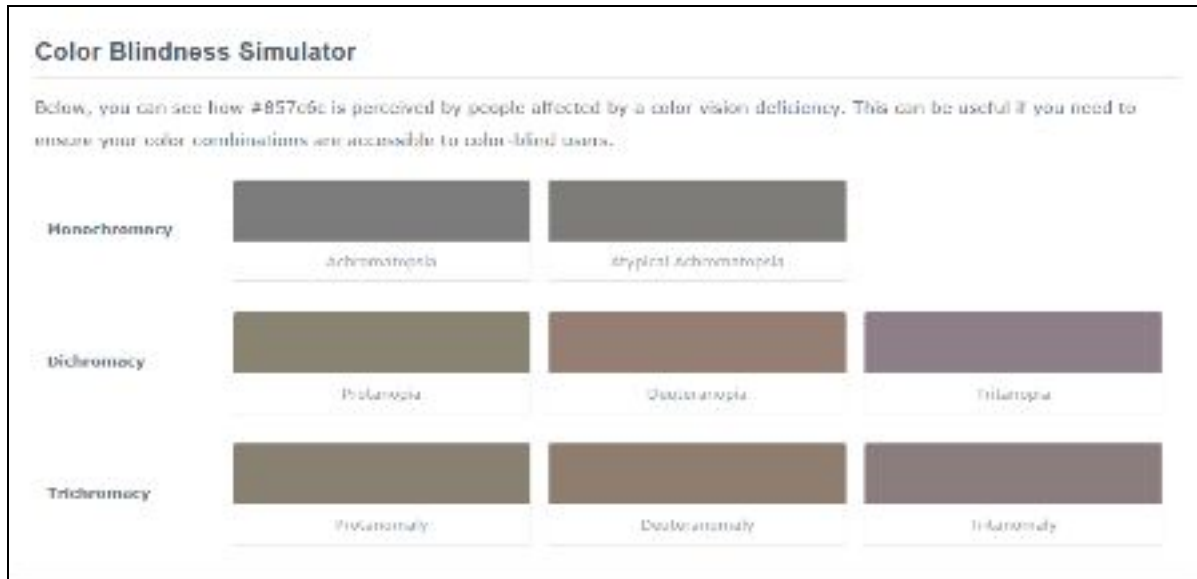
Original Color: hex #857c6c

Palette as Viewed by a Colorblind Individual:

-   *Assessment done for individuals with the most severe forms of colorblindness (between .01% and .001% of the population)*

Monochromacy:

Dichromacy:

Trichomacy:

Appendix C: Project Attributions

Team Member: Taylor Brown
Contributions to Project: Throughout the semester I collected and organized our group's assignment notes and posted them to the appropriate Slack and Trello boards for that week. I worked on selecting an accessible color palette and researched various color inversions for color blind users. I also conducted prototype testing with a color blind individual to determine whether our palette was, indeed, accessible. In addition, I edited the video tutorial for our final presentation and I contributed a great deal to the construction of the report abstract, narrative, and I conducted the color assessment in Appendix B.

Team Member: Tyler Monaghan
Contributions to Project: I had the original idea to work with Sakai for this project. I worked on the initial KLM-GOMS testing for the existing Sakai platform and helped with the environmental scan by working with Canvas (as deployed by Northwestern University). I took the lead on planning and creating our in-class quick presentation on 14 February. I created the table showing the mapping between existing and new Sakai buttons, and created the parts of the final class presentation (the button mapping and memory/cognitive load sections). I worked collaboratively with the rest of the group on the final narrative, in particular by getting the document started and compiling information and data from previous assignments, assessments, presentations, etc.

Team Member: Rebecca Parker
Contributions to Project: At the start of the semester, I performed an environmental scan of Blackboard - one of Sakai's LMS competitors - as deployed by the University of Pittsburgh. I participated in a comprehensive survey and discussion of Sakai's current interface and primary features with the entire group in order to create the initial hand-drawn wireframe. I then transformed my wireframe drawing, considering the group's initial reactions, into a lo-fi mockup using NinjaMock. From there I started the design process of our hi-fi prototype using JustInMind by mimicking the progress made designing the site's basic structure in the lo-fi mockup with some generic adjustments based on our first class presentation and group feedback. After handing the prototyping reigns over to Ashley, I primarily contributed to the prototype design through verbal feedback to her. Once we had a more completed prototype, I made a basic lo-fi mockup of a single site page as seen on a mobile device (also using JustInMind). Finally, I assisted in the construction of the final presentation and this final report. In particular, I prepared the first section under the title Design and Specification and proof-read the rest of the narrative. Also, I compiled the project into a GitHub repository (available here:

https://github.com/RJP43/SakaiRedesign) for COMP 441 assignment submission and our project team members' future reference.

Team Member: Ashley Walcott
Contributions to Project: Throughout the semester I contributed to each of the group Trello assignments by initiating the group response or providing feedback to my team members. With regards to the final project, I completed much of the final hi-fi prototyping work in JustInMind, based off Becca's work setting up the initial template and design, and ensured throughout the various design phases that I sought and incorporated my team members' ideas and feedback whenever possible. I assisted with editing and finalizing the slides for our final presentation, and for this final paper, I prepared the KLM-GOMS analyses based on our previous assignment, wrote the section on the stages of competency based off our presentation slide, and contributed content to several sections.