
Requirements Document

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Team

Jasper

Project

Jabulani School Simulation Portal

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Introduction

With today's ever increasing diverse population, there is now a new inquiry into how instructors can embrace the diversity of their student body — whether it is between a traditional face-to-face class, or one that is taught online. Current research suggests that diversity in a traditional classroom is a powerful asset, providing that the instructor is sensitive to individual student's backgrounds. However, it can prove difficult to deal with the diversity gap between students and teachers. To allow these teachers to engage with their students respectfully, teachers must know their students and their academic abilities individually in order to be able to respond in a culturally, socially, and linguistically appropriate manner. The best approach for teachers to obtain knowledge for handling specific diversity-related circumstances is by connecting to the experience on a personal and professional level of students with various backgrounds.

Our sponsor, Gretchen McAllister, is a Professor of Education at NAU. While teaching abroad in South America, she contemplated the idea of developing a school simulation portal that could amplify and fully encompass diversity sensitivity in an academic setting. This portal, appropriately named “Jabulani” — the siSwati (Kingdom of Swaziland) word for happiness, is to be made to lay the foundation for the future of diversity training in academia. McAllister's idea of the portal is to highlight a few of the key challenges and concerns regarding diversity, and illustrate ways to gain an understanding of diversity in the classroom and beyond. Much discussion about diversity focuses on the following forms of marginalization: race, class, gender, and sexual orientation — and rightfully so, given the importance of these forms of difference. In fact, students come to the classroom with different backgrounds, sets of experiences, cultural contexts, and world views. So far, McAllister has accumulated 600 virtual student profiles in a Excel spreadsheet, expanding many different diverse backgrounds. Along with these students profiles, she has also developed scenarios where these “teachers in training” will be able to interact with multiple diversity situations and address them accordingly. The concept of the portal is to allow both faculty and students to log in to the portal; faculty members can drag and drop from the online virtual database to create their own virtual classroom and assign scenarios and exercises to the students accordingly.

To address these challenges as Team Jasper, we have been working on developing a virtual training space called “The Jabulani School Simulation Portal”. This portal will allow teachers in training to access potential classroom scenarios and allow them to address the scenarios in the most appropriate manner. The solutions to such scenarios will be reviewed by the admin or instructor, since these responses are never as simple as “right”

or “wrong”. To develop this portal we are going to create a web application where faculty members and students can login to access this virtual classroom. Faculty members will be able to deploy a virtual classroom to further expand the student's academic experience. One of our tasks is to convert the 600 virtual student profiles excel spreadsheet into a online database where the faculty members can filter out or drag and drop virtual students into their own customizable virtual classroom. Along with their customized classroom, faculty members will be able to assign exercises and scenarios to them. From there, students will be able to login and interact with their assigned virtual classroom. As of now, Dr. McAllister resorts to using Google Classroom with the collected data to create simplified diversity scenarios/assignments. Our goal is to design a system that allows educational faculty to create and deploy individually customized classroom simulations, which are then used as the basis for a series of training exercises that allow education majors to gain hands-on experience with diversity issues they will typically face in a diverse classroom.

Our portal will be similar to that of Bblearn when it comes to authentication,grading and system initialization. Students and faculty will be able to log in to the portal with their credentials and will be granted separate privileges. Faculty will have admin controls, where they can set up their virtual classrooms and teachers-in-practice will be able to self-enroll in one. From there, faculty will have the privilege of grading their exercises and enable them to advance. The difference between the portal and Bblearn is in the interface, virtual classroom, and gamification. They will be a database filled with 600 virtual student profiles that faculty can fill the virtual classroom with.

This document will assess the details of how we intend to deliver our product and the requirement specifications. We will describe all the system requirements in detail and the intended purpose for development. This document will fully describe what the portal will do and how it will be expected to perform.

Problem Statement

Promoting diversity is a goal shared by many in American schools and universities, but actually achieving this goal in the classroom is often difficult. America’s schools have been struggling for years to close the ‘diversity gap’ between students and teachers. Our client, Gretchen McCallister’s goal is to create a portal where these teachers in training can attain hands-on experience with diversity issues that they will face in a common classroom. McCallister originally created a portal with NAU faculty members about a

decade ago. The system had multiple issues and our client biggest complaint was that it was not user-friendly and overall difficult to navigate. The page itself before it was outdated, not organized and had an unattractive layout. Consumers use your website to judge you, your company and your products before deciding whether or not they want to take a chance on you — it is important that the web portal makes a good impression. Our client helped the process of developing the portal, and she still did not even know how to navigate within the system. Users could not figure out how to simply login with their credentials. When landing on an outdated website that looks ugly, old or neglected, many assume some things about the company behind the website; many of these assumptions are negative. A decade ago, the web was a completely different place and Smartphones didn't exist. Simpler and customer-oriented web application are highly expected now. Below is the original portal created almost a decade ago.

Jabulani School District

Jabulani Elementary School | Jabulani High | Elementary Lounge | High School Lounge

Welcome to Jabulani!

This page is the starting point for information about the District and about each of our schools, Jabulani Elementary and Jabulani High School. Explore our District site!

Teaching at Jabulani


Interested in teaching at one of the Jabulani Schools? Click on either of the Application links below to fill out an online application to teach at our district.

[Elementary Application](#)

[High School Application](#)

You will be notified of your status by e-mail.

Jabulani High Students Pack New Computer Lab



Thanks to a federal grant, Jabulani High School opened a new computer lab last month. Students are flocking to the lab to use the latest multi-media software programs installed on every machine.

The new lab is also open on week-ends to provide hands-on access to students without home computers.

Visit our schools.

Click on the buttons below to go to each school web site.

Jabulani Elementary

Jabulani High School

Report Cards

Find out how we're doing. Click on the link below to view our School Report Cards.

[Elementary School](#)

[High School](#)

Another issue that our client dealt with is when the people maintaining the website left NAU. They didn't leave our client any admin access prior to leaving. When the IT staff running the web application left, the portal ended. A typical requirement for websites is to allow some user (authenticated users) to have certain privileges to run the website. The website itself had fallen to the domino effect. A failure in one location affected other spots in ways one may not expect. Web development is expediting at an aggressive rate.

Better and user-friendly interfaces are in demand. When it comes to developing a successful web application there are a number of factors defining that success.

Solution Vision

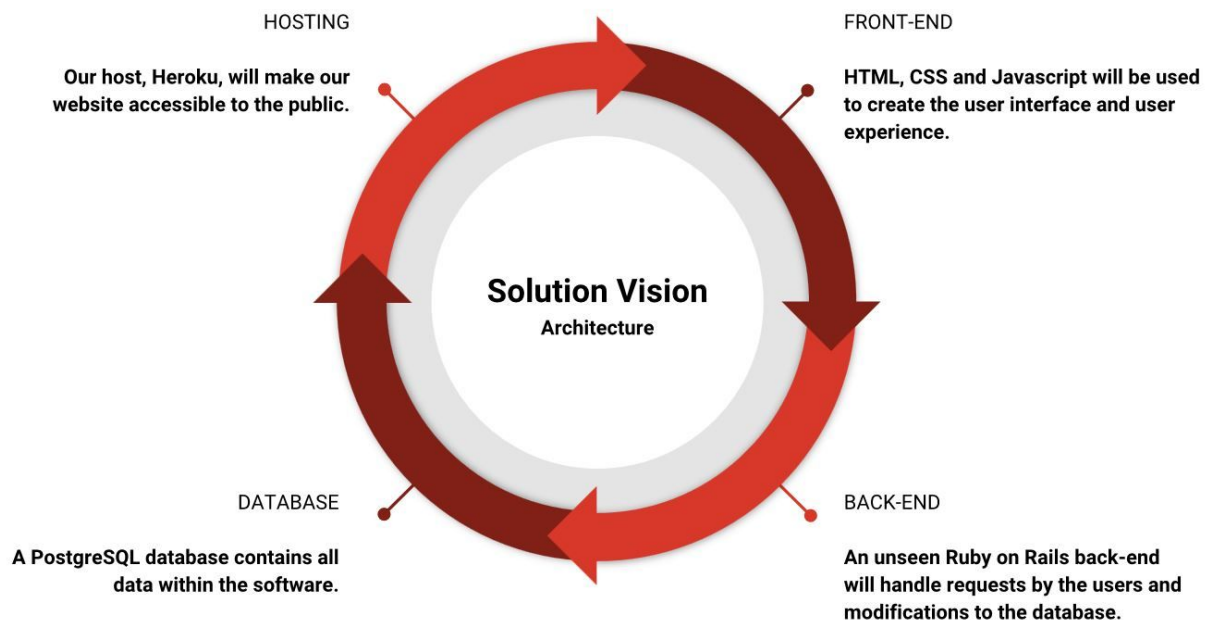
With the new Jabulani School Simulation Portal, teachers in training will have all the tools he/she will need to learn will be right at their fingertips. One of our main goal is to have the web application simple, user-friendly and easy to use. With our portal faculty and teachers in practice can sign in from any computer or mobile device to access class exercises, course materials, and feedback. The portal will implement a virtual classroom which will be an online learning environment. The environment will be web-based and accessed through the portal. Just like in a real-world classroom, a teachers in training will be interacting with multiple students in a virtual classroom participates. Within our portal faculty will be able to create classes, distribute exercises, grade and send feedback, and see everything in one place. Faculty will be able to track the teacher's progress to know where and when to give extra feedback.

Our client has an excel spreadsheet that contains 600 virtual student profiles and we are going to convert the spreadsheet into an online database. The data consists of a student's name and their characteristics. Putting data into Excel is easy, but when it comes down to it, Excel is not a database. It does not have the concept of data types, and cannot properly or easily enforce data validation. It cannot associate files and images with records. We are replacing the Excel spreadsheet with a centralized web database that will greatly simplify this situation. We are storing the data in an organized and structured way, so we can get it easily. We will be able to easily automate data collection, updates, and distribution through a secure interactive web database application. We want to allow our faculty users to update and modify this spreadsheet, then upload and implement those changes. So that any changes to data are instantly available to all authorized users.

To solve the problem of allowing someone else having the task of maintaining the portal, we will use roles to manage user access to Web pages. Roles enable us to apply the same access rules to a group of users, such as managers, administrators, members, and so on. To use roles, we will create new roles, assign individual users to one or more roles, and then grant access permissions to the role. Every user in that role is granted the permissions that are defined for that role. For example, we will create an administrator role, add users to the role and set up access rules that allow only users in the role to see administrator's page. Users who are authenticated but are not assigned to the

administrator role will not be able to access the pages that you configure only for administrators.

Interactive computer simulations with complex representations and sophisticated graphics are a relatively new addition to the classroom, and research in this area is limited. The design for the virtual classroom interface starts with the content and us creating a detailed initial layout for the simulation based on the learning goals of the simulation and the research base. The virtual classroom will be defined as a communication system that makes it possible for a group of people/users to come together to dialogue about something they want to learn, and to look at visuals (pictures, diagrams) and text that might aid them in understanding. Some of the benefits of a Web-based classroom are its geographic, temporal and platform independence, and it is simple, familiar and consistent interface.



The above diagram illustrates our solution vision for the architecture and technologies of the software. A front-end written mostly in HTML, CSS and Javascript will display and accompany data and requests handled by Ruby on Rails, which also communicates with a PostgreSQL database that will contain all of our data. Finally, the website will be displayed and made accessible to the public through our host, Heroku.

Project Requirements

Functional Requirements

Though we are developing a web portal, its various aspects must work together in order for the whole thing to function properly. These certain aspects are listed below and are considered mandatory along with other requirements requested by the client. The functional requirements describe the aspects of our project that are necessary for expected behavior.

FR1 — Administrator vs. Teacher-in-training site features:

Depending on whether an administrator or teacher-in-training is logged in, features and privileges should be separated accordingly.

1.1 - Administrators have access to most features:

- Access/edit student profile data
- Create/share scenarios
- Create/share virtual classrooms and edit their permissions
- Grade exercises assigned to teachers-in-training

1.2 - Teachers-in-training have less access to features:

- Can only view partial student profiles from assigned virtual classrooms
- Can only submit solutions to assigned scenarios
- Can only access virtual classrooms assigned by administrators

Use Case:	Log in to web portal
Description:	An administrator or teacher-in-training is logging in to the site
Actors:	Administrator, teacher-in-training
Preconditions:	None
Flow:	<ol style="list-style-type: none">1. User(still unknown) accesses site login page2. User enters and submits username + password3. Site verifies username + password through database
Post-conditions:	<ol style="list-style-type: none">4. User is recognized as an administrator<ol style="list-style-type: none">a. Administrator is redirected to administrator home pageb. Administrator can access, edit, or create classrooms/profiles/scenarios

	<p>4b. User is recognized as a teacher-in-training</p> <ul style="list-style-type: none"> a. Teacher-in-training is redirected to teacher-in-training home page b. Teacher-in-training can access limited classrooms, profiles, and scenarios
Alternate flow:	<p>4b. Username/password is invalid/unrecognized</p> <ul style="list-style-type: none"> a. User is redirected to login page b. User is notified of invalid username or password

FR2 – Virtual classrooms:

A requested client requirement for this project is the creation and management of virtual classrooms populated with virtual students. The virtual students consist of student profiles selected from the database.

2.1 - Populate virtual classroom with virtual students:

- Administrators should be able to handpick student profiles from the database to use in a virtual classroom.
- Administrators should be able to use or share predefined student population sets created by other administrators

2.2 - Add or revoke profile-viewing privileges to teachers-in-training:

- Administrators should be able to allow or prevent individual student traits from being viewed by teachers-in-training

2.3 - Assign virtual classrooms to teachers-in-training:

- Administrators should be able to assign teachers-in-training as a “teacher” for a virtual classroom
- Teachers-in-training should be able to be assigned multiple virtual classrooms as needed

2.4 - Add scenarios/exercises to virtual classrooms:

- Administrators should be able to add one or multiple created scenarios for teachers-in-training to complete after viewing in-class student profile data.
- Teachers-in-training should be able to submit solutions of scenarios to their assigned administrators, as well as look at limited student data to plan their best solution

Use Case:	Populate virtual classroom with student profiles
Description:	An administrator is adding student profiles into the virtual

	classroom
Actors:	Administrator
Preconditions:	The administrator is logged in with their recognized username and password (FR1)
Flow:	<ol style="list-style-type: none"> 1. Administrator selects a virtual classroom from home page 2. Administrator accesses database to search for student profiles (FR3) 3a. A student profile is selected and placed into the classroom 4. Step 3a is repeated until classroom is filled or desired population size is reached
Post-conditions:	5. The virtual classroom is filled with student profiles
Alternate flow:	<ol style="list-style-type: none"> 3b. Administrator selects a predefined set of student profiles 3c. There are no student profiles in the database <ol style="list-style-type: none"> a. The administrator is returned to the virtual classroom

FR3 – Interactive database:

Another key requirement for this simulation portal is a modular and interactive student profile database. Along with this are sections of the database which hold data invisible to users, such as passwords and profile data.

3.1 - Add/create student data profiles (and import initial 600 Excel profiles):

- Administrators should be able to create new student profiles on demand
- The 600 student profiles that were previously created should be seamlessly transferred into the database

3.2 - Edit or delete entries and traits from profiles:

- If necessary, administrators should be able to easily delete student profiles
- Administrators should be able to edit, delete, or add entry/trait information to student profiles

3.3 - Search and sort student profiles by specific traits:

- Student profiles should be searchable by specific profile traits
- A procured list of searched profiles should also be sortable by specific profile traits

3.4 - Store standard user login and profile data:

- Login credentials for all web portal users should be encrypted and stored onto the database

- Profile data and preferences for every individual user should be stored and applied on login

Use Case:	Access scenario or student profile
Description:	Administrator wants to access a scenario or student profiles from the database
Actors:	Administrator
Preconditions:	The administrator is logged in with their recognized username and password (FR1)
Flow:	<ol style="list-style-type: none"> 1. Administrator accesses database from home page (or after selecting a virtual classroom) 2. Administrator specifies whether students or scenarios are being searched 3a. Administrator enters search text into database search bar 4. Administrator submits search query 5a. Database searches for profiles or scenarios with matching text
Post-conditions:	<ol style="list-style-type: none"> 6. Matching profiles or scenarios are returned and displayed to the administrator
Alternate flow:	<ol style="list-style-type: none"> 3b. Nothing is entered into the search bar <ol style="list-style-type: none"> a. Search for all profiles/scenarios in the database b. Display list of all profiles/scenarios 5b. There are no profiles or scenarios in the database <ol style="list-style-type: none"> a. Display text stating that database is empty

FR4 – Scenario use/creation:

A requirement that works along with virtual classrooms is the ability to easily create scenarios/exercises. These scenarios detail a problem that teachers-in-training should solve based off the current knowledge they have from student profiles.

4.1 - Create scenarios using student profile data:

- Administrators should be able to create scenarios for teachers-in-training to complete after viewing in-class student profile data
- Administrators should be able to create out-of-class scenarios by just using student profiles pulled from the database

4.2 - Share or use created scenarios:

- Administrators should be able to share any created scenarios to the database for other administrators to use
- When assigning scenarios, administrators should be able to search scenarios shared by other administrators

4.3 - Assign scenarios:

- Within a classroom, administrators should be able to assign scenarios to teachers-in-training based off of in-class profiles
- Outside of a classroom, administrators should be able to assign scenarios that are shared by other administrators to teachers-in-training. The students in these scenarios are not specific to a classroom

Use Case:	Assign a scenario
Description:	An administrator is assigning a created scenario to a teacher-in-training
Actors:	Administrator, teacher-in-training
Preconditions:	The administrator is logged in with their recognized username and password (FR1)
Flow:	<ol style="list-style-type: none">1. Administrator selects a scenario from the database (FR3)2a. Administrator selects a virtual classroom they are overseeing3. Administrator assigns scenario to the classroom and teacher-in-training
Post-conditions:	<ol style="list-style-type: none">4. The teacher-in-training is able to interact with the scenario
Alternate flow:	<ol style="list-style-type: none">2b. Administrator directly selects a teacher-in-training instead<ol style="list-style-type: none">a. The scenario is assigned to the teacher-in-training without using a classroomb. The teacher-in-training can view the profile data of the students in the scenario

Performance Requirements

The non-functional requirements describe the aspects of our project that are essential for desired performance and how they will be measured.

NFR1 — Accessibility:

As a system focused on being inclusive, it is important for users of many backgrounds to be able to access the web portal. We will include the following to ensure that this is the case:

- The web portal will use colors and design choices that accommodate the visually-impaired and colorblind based on the specifications of Usability.gov.
- This will be tested by having a colorblind user interact with the system in the same ways non-colorblind users will.

NFR2 — Usability:

Our client has informed of that the previous iteration of the web portal fell short in usability, and many faculty had difficulty navigating through the site. To ensure this will not happen, we will include the following qualities:

- The system must include a design that enables users to navigate from one page to the next in less than 10 seconds.
- The user should take less than one minute to sign into their account.
- The user should take 2 seconds after completing a submission (scenario or response to scenario) to submit their response.
- The user should take 5 seconds to modify, search, delete, or add to the database.
- Users must have the ability to get expected results from each click. The user will take 2 seconds to simply navigate from one page to the next.

NFR3 — Reliability:

Given the amount of expected traffic and simultaneous use of the web application, it is extremely important that the system is always accessible to users at all times.

- The web application must load in less than 60 seconds at all times and each page following the landing page should take less than 5 seconds to reach.
- Due to the host that is being used, it is unlikely that a user will experience problems with reliability.

NFR4 — Maintainability for future refinement:

After the project has been completed, an external group will be making changes to the UI and overall design of the web application. As a result, the system will need to be easily modified by non-members of team Jasper. The following are required:

- Code will include blocks of comments that are deciphered by non-technical users in less than 10 seconds and able to be modified by minimally experienced programmers
- There be leeway given in areas the client has expressed the intention to expand upon and comments indicating this.

NFR5 — Secure login authentication:

As with most user credentials, a secure method for logging into the web portal must be implemented. Since there are plans to sell versions of this web portal to other institutions, it is imperative that all logins are authenticated and secure.

- User login information should be encrypted upon being submitted
- Submitted information should be sent to a database through our secured site
- The database itself should be secure and preferably separate from the server holding the web portal's files

Environmental Constraints

The environmental constraints are factors that will limit the performance requirements. This includes:

ER1 — Cross-platform compatibility:

- The web application will ideally display and function identically among different browsers and operating systems. However, this likely can not be completely guaranteed with users on legacy browsers and operating systems

ER2 — Parsing of original Excel File:

- The parsing of the original Excel file that contains the 600 student profiles will rely completely on the formatting of the data.
- Since this is a one-time process, this will require complete and accurate extraction.

ER3 — Scenario entries and grading:

- While administrators will create scenarios based off student data, the scenarios themselves are somewhat open-ended and not in a specific format. Most likely we will be storing the scenarios as text with few technical options
- Similarly, our client wants to avoid an automated grading process which means grading will likely be a manual process. Administrators will manually assign or revoke student profile privileges to teachers-in-training based off manual grading.

Potential Risks

As with all software, there are many potential risks that are involved. Considering that our software will not be life-threatening if it fails, ours is relatively low risk. That being said, there are still many impacts of some potential risks that we will try to avoid.

Being that our software technologies are new to most of our team members, there is a risk that we may not learn what we need to in a timely enough manner to deliver on our requirements. The impacts of this could be major. It could result in us delivering an incomplete, unusable product. Diving deeper, there are many risks involved with the user authentication system. This is one of the most important pieces of this software in terms of ensuring its security and stability. It must be very secure, or else there is a risk of it getting hacked and information leaking out. There is also a risk regarding functionality of the user authentication system. For example, if our system cannot perform a password recovery mechanism properly, user's passwords may be lost forever.

As with any website hosted on the world wide web, there is a risk of hacking attempts being made on it. For our client, a hacking attempt on our website can result in frustrated users, data loss, or worse. One hacking method that is very common is DDoS, or distributed denial of service attack, where the server experiences heavy traffic until it cannot work anymore. For all users, our website will be unusable and they will be inconvenienced. If a teacher in training is trying to complete their exercises, they will not be able to. Other types of attacks may arise in the future as well. Luckily, the information encompassed in our software is not personal or sensitive outside of passwords to our system and basic contact information. But with hacking, there is always an element of unknown with the risks involved - they may be able to use our information as a trace to more sensitive information on user's computers, or steal the entire software.

One of the more likely risks that we foresee occurring is in regards to the UX (user experience) and UI (user interface) components. Users must be able to easily understand how our system works and where to find things they need. They also must feel comfortable in interacting with the JASS system overall. A poorly designed UX or UI could result in confusion and frustration for the users. It may also "make or break" the future of the software as whole. If our software fails to appear professionally designed or attract and keep enough users engaged with it with a well-designed UX and UI, people may not continue to keep using it and the software may never take off.

A risk with a potentially bad outcome is failure on part of the team to successfully meet ADA compliance. ADA compliance means that we must make our website usable by persons with disabilities such as blindness or deafness. For these users, if they cannot

use our website, they can become frustrated or feel discriminated against. This could then result in notifications being sent to us about it, or potentially even a lawsuit filed against us.

Project Plan

In order to develop our schedule, we first need to define the activities, sequence them in the right order, estimate the resources needed, and estimate the time it will take to complete the tasks. The scheduling aims to predict the future, and it has to consider many uncertainties and assumptions. As a result, many people believe it is more of an art than a science. Sometimes you start a project without knowing a lot about the work that we will be doing later. That's why we decided on using the rolling-wave planning, it lets us plan and schedule only the portion that we know enough about to plan well. When we do not know enough about a project, we will use placeholders for the unknown portions until we know more. These are extra items that are put at high levels in the WBS to allow us to plan for the unknown. We also plan on using Teamweek, which is a project management software to help us get the best overview.

January 14 — January 20 | Convert Excel Spreadsheets into Web Database Application

January 21 — January 27 | Create Graphical User Interfaces (GUIs) collectively for the front-end of the web page

January 25 — January 28 | Test and connect the Web Database with the User Interface

January 26 — January 31 | Develop Login Page and User Authentication

February 1 — February 14 | Design and develop Virtual Classroom Simulation

February 12 — February 19 | Testing Frontend with Backend and implementing Virtual Classroom

February 15 — February 22 | Update and Test Interface

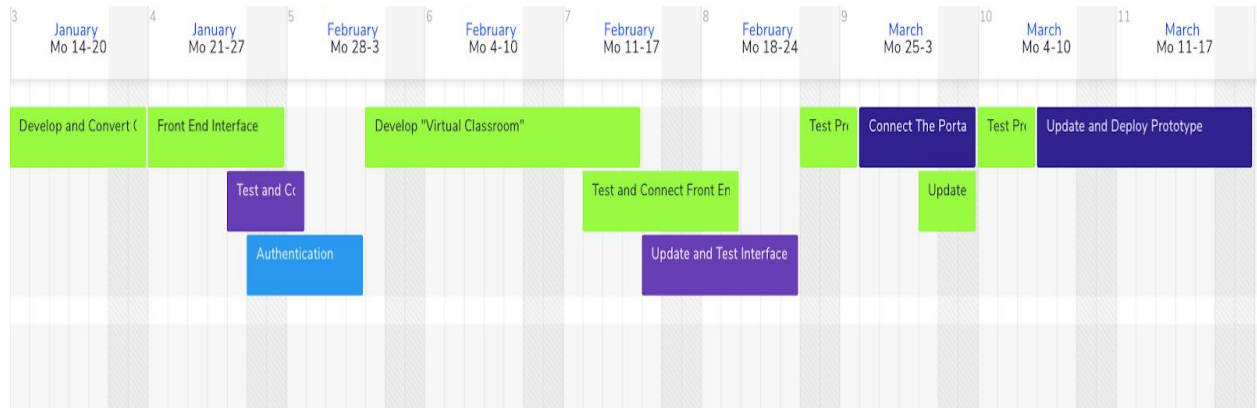
February 23 — February 25 | Test Prototype with Users

February 26 — March 3 | Connect the Portal with Virtual Classroom

March 1 — March 3 | Update the User Interface

March 4 — March 6 | Test Prototype with Users

March 7 — March 17 | Update and deploy Prototype



Conclusion

The increasing diversity in education has required teachers to become more aware of their classrooms and how to conduct them respectfully. The mission of our sponsor and our team is to create a tool that will facilitate this experience interactively. Current research suggests that diversity in a traditional classroom is an asset if the instructor is sensitive to students' backgrounds. This web application will be a crucial aspect of diversity training for student teachers throughout NAU. In addition, the client has goals of expanding its use to schools throughout the United States, furthering its impact. This portal will create a space for faculty to share scenarios with student teachers using student profiles to better their teaching performance. Given our complete understanding of what is required to complete this project, we are excited to begin the implementation process to help make this all possible.

This requirements specification document has provided overall clarity of the project requirements and details the expectations that are to be met. It has projected future dated highlights that will be faced next semester as well as what must be done to materialize the vision. The topic of multiculturalism in an online classroom is limited; therefore, this portal will help to highlight the need of such conversation in the study of education. The growth in a virtual classroom will inevitably opens the doors of an otherwise inaccessible educational opportunity to a larger number of diverse students, thereby altering the traditional classroom makeup. Teachers in practice, traditionally limited to regional opportunities, now have the option to take courses in different states

or countries. Experienced teachers understand that one of the most effective ways of embracing diversity in the classroom is to take advantage of their students' different abilities and backgrounds. Future educators interested in fully embracing diversity in the classroom will benefit from using the Jabulani School Simulation portal.