

Requirements Acquisition

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Project

Tailored Tutoring Business Portal

Robert Lokken

Mentor

Ana Paula Chaves Steinmacher

Team

Alex Kahn

Jesus Garcia

Tyler Mitchell

Taylor Walker

The requirements laid out in this document will serve as the accepted baseline requirements for the project.

By the client: _____

By the Team: _____

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Introduction

With the growth of the internet and technology, and the decreased efficiency of time and location-dependent in-person tutoring; there has been a steady rise in online tutoring platforms. It just seems “easier”, and “more-efficient” to access tutoring online. While learning styles may be a personal preference, the data and statistics on the industry supports that claim for the majority of people. In 2016, the total revenue of online tutoring services was \$411 million dollars, with an annual growth rate from 2011 to 2016 of 4.2% [1]. For 2017 to 2021 the projected annual growth rate is 12.75% [2], meaning that the market is expected to double during this time. But why are we interested in this?

Meet our client, Tailored Tutoring Co., and their founder and CEO, Robert Lokken. A smaller, Flagstaff-local start-up in the online tutoring industry. While they are up against some of the industry-giants like Chegg, and some people’s choice of the most complete online tutoring platform: WebWiseTutors [3], it is finding their niche market that really makes companies successful.

Right now, Tailored Tutoring Co. has two things making them unique: 1) Their niche market of Flagstaff/NAU (Northern Arizona University) user-base and Flagstaff/NAU specific tutors, and 2) Their “Problem-Submission” feature. With tutors who are familiar with NAU and local Flagstaff schools course offerings and material, it makes it easy for users to find and get help with these specific subject areas via tailoredtutoringco.com. Also, Tailored Tutoring offers the standard tutoring features of online or in-person tutoring for these subject areas. With plans to grow the business down in Phoenix and ASU (Arizona State University), as well as Tucson and UofA (University of Arizona). However, what really sets Tailored Tutoring Co. apart from their competitors and potentiates their capability for growth, is their unique “Problem-Submission” feature.

The “Problem-Submission” feature allows students to upload a picture of their homework problem to the site, and receive a personalized video-solution that they can then view and watch as many times as they want. When you look at some of the industry-giants, they do not have this option. As a user/student, sometimes you just need help with one or two specific problems that you don’t understand. Do you really need to schedule and set up a whole 30-minute or 1-hour long tutoring session for help on one problem? Or, isn’t it easier to submit a picture of your problem, and then have access to a detailed video-solution that you can rewatch?

While this “Problem-Submission” feature is what makes Tailored Tutoring Co. unique, it is also a laborious and completely manual process for founder and CEO, Robert Lokken. We will explain in further detail under the “Problem Statement” section of this document; but currently, Robert receives email notifications that these problems have been submitted. Then manually has to go notify a tutor, wait for a notification from the tutor that the video has been posted, and then manually create a link for the video and email it back to the user. Currently, Tailored Tutoring Co. still only has a small user base, and 4-5 tutors with limited subjects offered. But, as the business continues to scale, there is no way this feature can exist without being automated.

Which is where we come in, capstone team Business Web Solutions. We plan to fully automate the “Problem-Submission” feature, eliminating the constant notifications and upkeep for Robert. Also, another problem we have yet to mention and plan to solve, is optimizing the site and this process for mobile. As it is right now, from the user side, it can be a clunky and time-consuming process to upload a picture of the homework problem. Since the site is not optimized for mobile, many users find themselves having to take a picture on their phone, then email it to themselves (possibly downloading and saving it), and then go to the Tailored Tutoring site via a desktop or possibly their mobile-device and submit the picture that way. All of this can be visualized in the diagram below:

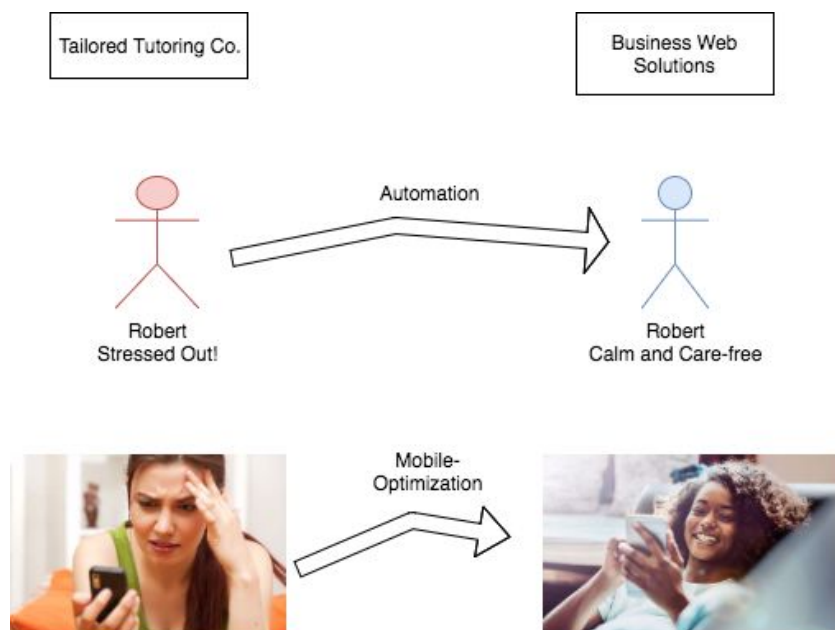


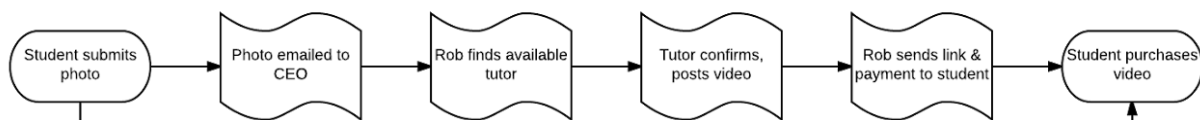
Figure 1- Problem-Solution Diagram

We intend to solve both of these major problems by automating the “Problem-Submission” feature, and building the site and submission process optimized for mobile-devices. This will allow Tailored Tutoring Co. to scale as a business, making more revenue with their current business model of charging a fixed rate per minute of the video solutions posted.

In this document, we will describe in more detail the actual problem/s, our solution and how we intend to solve it, and the specifications of what that solution will entail.

Problem Statement

Currently, Tailored Tutoring’s “online submission”, their hallmark service, is a very unique, but also tedious process for not just the customer, but for the CEO as well. The original workflow for the online submission process is as follows:



1. The customer navigates to the website and uploads an image, which is then emailed to Mr. Lokken.
2. Mr. Lokken then checks availability of tutors and finds a tutor in the needed subject area, sends the photo to them and waits for a response.
3. The tutor must confirm that they can take the assignment, by returning email to Mr. Lokken. The tutor then films their solution video and posts it to an online storage site.
4. Mr. Lokken locates the video, and creates a link for viewing it, which he then posts to the Tailored Tutoring website, and emails the student that their video is available for purchase.

While this is a unique service that helps many students in the Flagstaff area, it is clear how much time and personal management must go into the current model to sustain it. The main issues with the process are presented in the amount of manual work that must be done to complete a single submission, and the fact that Mr. Lokken is merely a middleman throughout the entire process. While these steps are currently managed by Mr. Lokken, there is no reason that any of them couldn’t be automated and performed faster, with less overhead time, and with less cost.

While there are many problems present in this workflow, we are aiming to fix:

- The amount of time wasted for Mr. Lokken having to manage this process.
- The steps for getting the product to the customer should no longer involve anyone but the student and the tutor.
- The student and tutor should receive a notification when a photo/video is posted.
- The student should be able to easily take and post a picture to the website on a mobile phone.

These goals are simple and can easily be solved through mobile-optimized web portal, which our team plans to implement for Tailored Tutoring Co.

Solution Vision

Considering the problems present in their current business model, and seeking to enhance the service that Tailored Tutoring offers, Business-Web Solutions plans to implement a mobile-optimized web portal that automates the online video tutoring for Mr. Lokken's company. This portal will have profiles for both tutors and students, where each profile type will have their own capabilities while on the portal.

Tutor Profile

Tutors will be able to create and customize their own profile, which will also include the courses they are able to teach and their email. They will be able to accept assignments from student customers that are in their course areas, and can post video files to respond to student assignments. This allows the tutors to have a personalized appearance in their work environment, and can easily interact with students to streamline the tutoring process.

Student Profile

The student profiles will also be able to create and customize their profile, including which courses they are enrolled in. The students will have an input area where they may submit a picture file to be sent to a tutor, and an archive area where they may view videos they had purchased in the past.

More Details

A finer look at our solution may be more valuable, so let's consider the data involved, how it is collected and used, the changes this application makes to our sponsor's business, and how this application may change the online tutoring business as a whole.

The data involved with our application will take three forms, JSON files, video files (i.e. MP4 files), and picture files (i.e. JPG files). The picture files will be collected from customer submissions, which will be the starting point in a transaction. Video files will be produced and submitted by tutors, which will then be archived for students to view later and for administrators to consult for business purposes. The JSON files will be stored in our application database, and will hold each user's profile data. These will be generated when a customer or new employee creates a profile and fills in their personal information, and will then be stored in our Mongo database for use when opening that profile on the application.

Our sponsor's business will be greatly affected by our application, and for the better. The online video tutoring service is a major staple for the company, so our application should greatly streamline how long this service takes to provide, as well as make sure that this service is easily repeatable and archived to encourage students to be returning customers. This application will ensure Mr. Lokken to have no hand in the submission process, which allows him to freely spend time in other areas of his business.

This application will allow tutors and students to communicate directly with each other, which is a first-of-its'-kind idea, allowing students in need of academic help to be directly linked to a professional in the field of their current study. With hope, this application will begin a larger movement of tutoring services being more closely connected to their customers.

Project Requirements

This section's purpose is to present the key functionality of our solution, without going into too much specific detail on exactly how we will build or implement those decisions. We will try to present the functionality in a hierarchical form, starting with the broader functionality, and then get more into the specifics of how we will accomplish that. Also, there will be three main subject areas:

1. Functional Requirements- The actual functions of our solution, web-application. Starting with higher-level functions, and then presenting the lower-level specific functions that will accomplish those goals.
2. Non Functional Requirements (Performance)- How we will expect our functional requirements to perform, and how we will measure that performance. (This section may contain some assumptions, but we will clearly identify those assumptions).
3. Environmental Constraints- Constraints that are imposed on our solution, either via our client and their needs, or specific technology constraints.

1) Functional Requirements

FR1- User Profiles

Perhaps the most important aspect that Mr. Lokken has stressed to us is the addition of Student and Tutor Profiles.

1. Create- Users can create a Student or Tutor profile
Note, we would also allow creation of Admin profiles, for Mr. Lokken himself, and give him permission to create other Admin profiles, as well as add/delete certain permissions for those created profiles.
2. Log In- Users can log in with Student, Tutor, or Admin profiles
3. Customize- Users can customize their profile. Users will be able to customize:
 - Their name
 - Their location
 - Their school
 - Their enrolled courses (Students)
 - Their teachable courses (Tutors)
 - A short description about themselves

FR2- Interactions and Workflow (Users and System)

The users will need to be able to perform certain interactions with the system, and thus, the system will need to perform certain actions depending on what the user ask for. In the previous section we discussed User Profiles. Here, we will focus on the workflow of those users interacting with and utilizing the system.

1. Upload Images- Students can upload images to the web server
2. Process Images- the System will take the images and assign them to available tutors in that given subject matter
3. Tutor Notification- the tutors will receive some sort of notification from the System (most likely an email)
4. Upload Video- the Tutors can then upload a video solution
5. Student Notification- the System will send a notification to the student, that their video solution has been uploaded, along with the link
6. Payment Prompt- when students follow the given link in their notification, the System will prompt the student for a payment method
7. Video Download- once payment is processed, the Student can then view the video, and download it
8. Tutor Review- the Student can leave a review on the tutor and video

FR3- Raw System Requirements

Our system will have to be robust and be able to handle large amounts of user accounts as well as images and videos with their corresponding metadata. In the previous section we discussed the interactions, workflow, and relationship between the user and the system. Here, we will focus purely on the System, and key capabilities that it must be able to handle.

1. User Entries- System must be able to create new user entries in database
2. Facebook Process- System must be able to process information from Facebook through Facebook login

Mr. Lokken expressed great interest in having Facebook Login capabilities, so our System will need to be able to communicate with Facebook and perhaps link a user account with the information from the Facebook account. This requirement is tentative, meaning it will only be implemented if time permits.

3. User Storage- System must be able to indefinitely store these users, along with their granted permissions
4. Emails- System must be able to send emails to all prevalent email domains
5. Images & Videos- System must be able to serve images and videos to users
6. Video Streaming- System must allow for streaming of videos on-site
7. User Reviews- System keeps reviews in a database assigned to the users that gave them
8. Mobile Friendly- System must be easily usable with a mobile device
9. Payment Processing- System must be able to process payments using debit/credit cards or Paypal on-site

Mr. Lokken has expressed great interest in keeping payment processing on-site, so that users don't feel like they are going to a whole new website to pay. Hopefully instilling more trust from the users.

2) Non-Functional Requirements (Performance)

NFR1- Functional Suitability

1. Error Resistant- System should be able to function with a 99.9% resistance to errors
2. Video Viewage- Users should only be able to view videos they themselves have paid for

3. User Permissions- User permissions will be concrete and users will not be able to perform actions that are not within their permission range
This will be built into the functionality of the standard user profiles we build for students and tutors (see FR1.1 “Create”). There should be a 99.9% accuracy to permissible actions based on the permissions that we set for each profile. Meaning, users will not be able to perform actions that are not within their permission range. Same goes for the Admin profiles that we allow Mr. Lokken to create.

NFR2- Performance Efficiency

1. Display Data- User profile data should be displayed immediately upon request. Again, in the final solution, we expect a 99% accuracy rate in it retrieving and displaying the correct data.
 - a. User data is stored in MongoDB on the cloud, should be a simple get request on loading profiles
2. Messaging Notifications- Messaging system for relaying file upload to tutors and clients should be immediate. (See FR2.3 and FR2.5, “Tutor Notifications” and “Student Notifications”)
 - a. We will allow for a 2 minute overlay between the file being uploaded, and a notification being received from either the student or the tutor
 - b. This can be verified with simple testing

NFR3- Compatibility

1. Browser Compatibility- The system should work with a multitude of up-to-date browsers and computers. We will implicitly check for compatibility with Google Chrome, Mozilla Firefox, Microsoft Edge, and Safari. We expect it to function perfectly with at least 3 out of those 4.
2. Image Compatibility- The system should work with any format of image. We will implicitly check for png, jpeg, and pdf files. Expecting 100% compatibility with those 3.

NFR4- Usability

1. Intuitive- System should be intuitive for both clients and employees
 - a. Little help is required to understand what to do.
 - b. Verified with testing users- by giving them simple tasks such as “Log In”, and making sure they can accomplish that in 5 clicks (this is an assumption here, we may tighten or loosen the 5 clicks based on how we actually build out the Log In task, and how many clicks it would reasonably

take). Also, we expect a 90% success rate in the users being able to accomplish main tasks, which will be “Logging In”, “Uploading Image”, “Purchasing Video”, and “Downloading and Viewing the Video”. Which we will all test implicitly. (See FR1.2, FR2.1, FR2.6, and FR2.7 respectively)

2. Error Abstraction- Any errors should be abstracted away from the Users, to be usable by IT staff
3. Interface Build- The user interface should mimic the current build or any other build approved by the client

Mr. Lokken has loosely sketched out some designs of the interface, we will work with him to obtain approval of the final implementation of the interface.

NFR5- Reliability

1. System Availability- Based on the nature of the business, this system should be available at least 99.99% of the time.

This only excludes such rare cases as our main storage, Amazon Web Services, completely crashing due to some catastrophic storm or cyber attack. However, this is highly unlikely.

NFR6- Security

1. Secure Information- User information should be kept secure, as sensitive information like Credit/Debit card numbers may be stored
2. Password Check- Each user account should be safely secured through a password (testing FR1.2 “Log In”)

We expect a 99.9% password check. Meaning, users can only gain access with the matching, or correct, password to the account.

NFR7- Maintainability

1. Updating Prices- The system should be able to modified to suit changing prices This will allow for “special” pricing events (think “deals” that Mr. Lokken may want to implement). But also, will allow for updates to prices as the company grows or to match inflation.
2. Updating Data- The system should be able to adapt to increasing data needs Tailored Tutoring will start out with a current data need, but as the business grows may need to allow for more data storage. This is the reason we have chosen flexible tools such as Amazon Web Services, as scalability was a major concern for Mr. Lokken.

3. Legacy Methods- The system should support legacy methods in the event of major errors

NFR8- Portability

1. Mobile Optimized- The system should be coherent when used on a mobile device
 - a. We will design for all sizes of screens, and check that the information displays correctly on 95% of mobile devices (see FR3.8 “Mobile Friendly”)
 - b. Users should still be able to adhere to the same testing standards laid out in section NFR4.1b, using mobile devices instead of laptops or desktops.
2. Orientation- The system should be able to adapt to changing orientation of the device
 - a. We will test this again, by making sure the information or web-site displays correctly on 95% of mobile devices when flipped from vertical to horizontal
3. Browsers- The system should be able to be used on various up-to-date browsers (see NFR3.1 “Browser Compatibility”)
 - a. We will test using multiple browsers that have all updates provided, and expect a 75% success rate. We have to allow for some leeway, as certain technologies simply won’t work with older versions. This might be our lowest testing expectation, but we fill it is still be reasonable given all of the technologies and options out there.

3) Environmental Constraints

Fortunately, our client has been very lenient about what technologies we may use to implement our solutions.

EC1- Definite Constraint

There is only one definite constraint that we have.

1. Amazon Web Services -Our solution will be required to be held to any constraints imposed by Amazon Web Services in regards to what kind of data can be stored on their service. This shouldn’t be a problem as the only type of media that will be expecting is images of homework questions and tutor videos.

EC2- Possible Constraints

However, there are many possible constraints that we could run into. We have discussed with Mr. Lokken many features that he would like to have implemented, but not has not stressed as a priority. The main features and functions we have discussed

throughout this document will take priority. And if time permits, we will also implement the functionality, which leads to the following constraints.

1. Facebook Login- System will need to implement and be compatible with any libraries that Facebook may require or not allow
Mr. Lokken has expressed interest in alternative login methods, such as Facebook Login. If we get to this feature, we will be constrained by compatibility with certain libraries via Facebook Login.
2. Mobile Application- The System must be compliant with Apache Cordova
Mr. Lokken has expressed great interest in having a mobile app version of the site. The app will need to be compatible with both major platforms, Google Android and Apple iOS. We have chosen technologies that are currently compliant with Apache Cordova, should we need to port the website into a mobile app. Once again, if time permits.
3. PayPal- System payment service must be compliant with PayPal payment service
Again, our client, Robert, has expressed interest in incorporating PayPal as a payment method on-site. Once again, if time permits.

Potential Risks

Risks are an important thing to account for when designing a system. Quality assurance is an important part of any long term development process. Our job as developers is to not only provide a product but also attempt to account for any issues that may arise after release. This can be things like error checking and handling, or unit testing. Since our window of time for development is so short we cannot address all methods of quality assurance but we can still evaluate potential risks and attempt to account for them. Here we will attempt to identify the larger risks that can affect our client and his business the most.

The first major risk that can arise with our system in the future is running out of space in the database for holding the submitted files.

Our client wants to archive all files submitted by users and by his employees. By keeping an archival his customers can continually come back to the video they have purchased and use it for future reference. The problem arises in storing that much data. A risk with such a large archival is running out of space in the database. This is likely to occur if our client intends to truly archive all of his files. This is where AWS' services come in. In utilizing AWS our client has many options to increase his storage space as he sees fit. If those plans don't work out we have also discussed temporary storage of

files in which users have a time frame to download their purchased videos. After that time frame the video gets removed from the database. This is a great solution to save space and money, but ultimately gives responsibility to the customers. This fix is ultimately up to what our client can afford and how he evaluates cost vs. customer responsibility.

Another risk is data retrieval failure. This can be anything from user data to the video products. It is important that our system can pull in the data as it is requested in a timely manner, and fail gracefully if it can't. Since no user data will be stored on the client side it is important for us to account for potential errors in retrieval.

In order to account for retrieval errors we have to catch them as they happen. This means performing error handling on every step of retrieval. It is important that we catch any errors and report them to the user so they can still complete their actions despite the error, or report it if necessary.

This leads to the next risk and how to appropriately handle it. A risk with business model itself is sending user submitted files to each other. This is necessary for customers to send questions to tutors and tutors to send videos to customers. This is an integral part of the process and so should be fool proof. A major issue that can arise is corrupt or unviewable files. A customer might send a picture with terrible lighting making the question hard to see, or a tutor can accidentally send a video without audio. A reporting system will be necessary on both ends to notify the sender that there is an issue with their file. This will ensure that customers are getting quality content as well as tutors get everything they need to perform their job.

A reporting system can be built on the backbone of our original send and receive system so it won't add much to the workload to ensure this risk doesn't cause a lot of harm to the business.

Since our project is comprised of many moving parts there is a likely chance of something failing along the way, with the worst case scenario being total system failure. Each of the above risks show a potential area of failure and so must be handled so as not to affect the business. In the event of a total system failure a contingency plan must be made in order to keep the business going temporarily until the system is fixed. Thankfully our client's already established system can work as a temporary fix in the event of a wide-scale failure.

This will only be implemented in a case where the site is completely inoperable, which is not likely to happen, but planning for it, like any other risk, is important.

Project Plan

We have decided that it would be in our best interest to have a deadline for our final product a several weeks prior to our Capstone Final Presentation so that we would have time to finish any last minute changes we may have to make. In figure 2 below, there is a Gantt chart that graphically represents our timeline, where the gray section highlights the period of time where work will be slow as a result of winter break. Below is an outline of the end dates of goals we plan on having completed by:

- 11/21 - Finalize all the requirements by our client
- 12/05 - Have a presentable tech demo that shows our technology working together
- 12/05 - Have a rough draft of what the client can expect in February
- 02/01 - Have a rough prototype of the Desktop version ready for our client
- 02/14 - Complete integration of user accounts
- 02/27 - Complete integration of Payment (M.V.P. Milestone)
- 03/07 - Have feedback from client and maybe some testers
- 03/14 - Apply feedback from client and testers
- 03/14 - Have bugs ironed out (80% Completion)
- 03/28 - Completely finish the visual design of the site

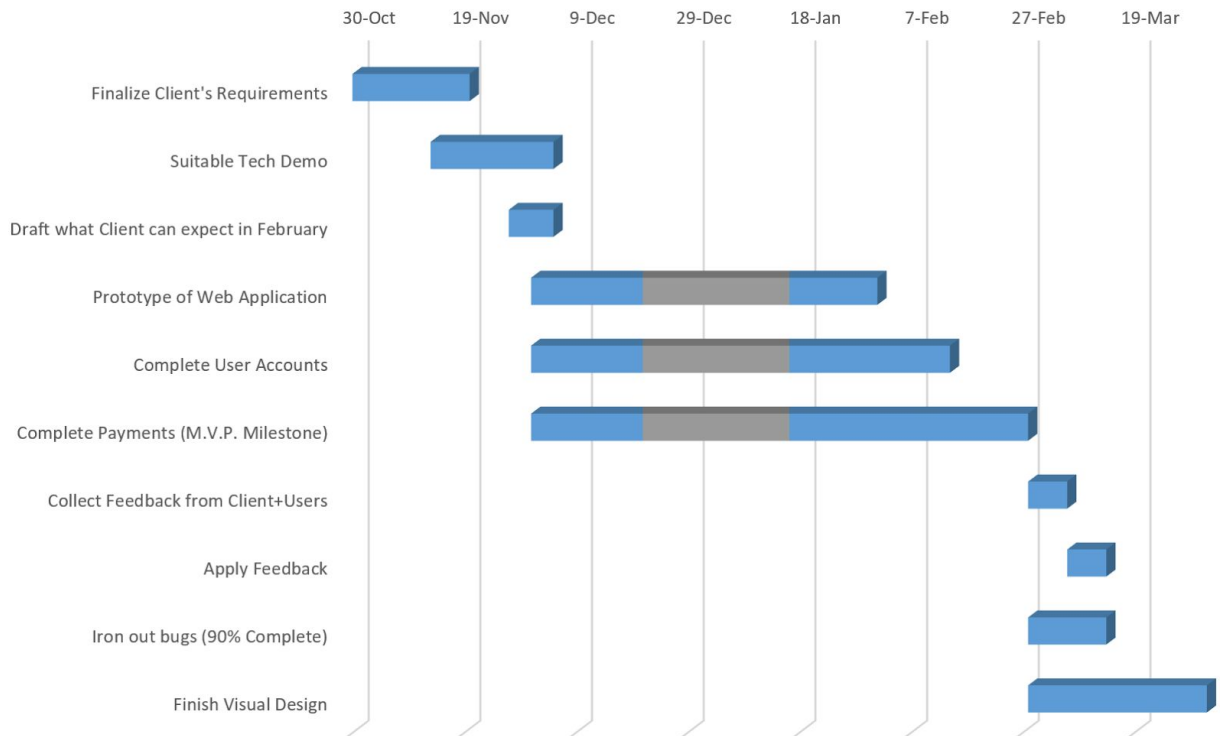


Figure 2- Goal Timeline

Conclusion

Our client’s tutoring business serves clients all over the Flagstaff area, and in many subject areas. This is a service that is invaluable to hundreds of students, and Mr. Lokken hopes to scale this to more schools in the future. With such a blossoming and useful business model, Tailored Tutoring needs the software infrastructure to support their services, and Business-Web Solutions is here to provide that software.

Tailored tutoring provides their unique “online video tutoring” service to their customers to keep their edge in the market, and this has set them apart from the competing tutoring services in Arizona. They have a business model to encourages students to reach out for professional help in a fast, easy way, but this service is currently implemented in a manner that takes a huge portion of time and personal management to run. It requires constant review and monitoring to see new photo submissions, match pictures with tutors, and speedily get videos to customers.

Tailored Tutoring is part of an industry that serves millions of students a year, and has clear growth coming in the future, so to enable this company to continue to succeed, Business-Web Solutions will provide a web portal application that can process all customers with picture submissions. This will automate the submission process, will

notify tutors and students when their product/work is ready, and will completely cut out any needed human management for this process.

Reaching these goals will allow Tailored Tutoring to bring in more customers, respond and satisfy customers faster, and allow the CEO to devote more time to company growth rather than company sustainment.

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