

Team Undefined
Updated Software Design Report
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Introduction

a. Problem Description

Japanese professor Yoko Kano needs a web based software that allows Japanese English students and English Japanese students to communicate with each other. The system must support user logins through which the opposite native speakers can leave video audio and text messages for each other and respond. Ms. Kano also wants a quizzing/assessment component which records student responses to pre recorded video prompts by Ms. Kano. Student recordings and assessment responses as well as statistics about student usage, such as number of attempts, login dates and total talk time must be visible to teacher users. The site must be visually attractive. Other possible future features that may be added to take into account during design of the site include the addition of optional Japanese interface text, the addition of student to student video chat (must be recordable for teacher).

b. Similar Projects

HTML5 Video + Audio Recording Component

Description:

This project is using webRTC's getUserMedia() spec to record audio and video both in the client side and upload as chunks to the server, current project support latest versions of Opera and Chrome and hoping to provide support for Firefox in near future.

c. Benefits of Project

With this software foreign language professors will have an efficient way to determine a student's progress in their class. Students will be able to sign up, practice the language they are learning with a native speaker of that language, and receive real time feedback during the chat and later from a professor on their progress.

d. Project Issues (Ethical, Security, Legal, Societal)

The most important ethical/legal issue that will be handled is keeping client information secure and not sharing or using any information about clients for personal gain. Client's information will not be shared without their consent first. For the societal aspect of the software, there will be moderators for chat sessions as well as the message boards that are used by students. The moderators will keep discussions civil between two students and remove any member of the site that cannot adhere to the rules.

e. Purpose of Report

The purpose of this report is to give all team members a clear and concise vision of the purpose and the steps needed to complete this project. The report also presents a readable description of the software being built and the processes taken to build it, for anybody that is not already familiar with the software.

f. Success Criteria

Visually attractive site allowing an easy-to-use interface for Japanese and English students to communicate with one another via pre recorded video and text messages. Website allows recorded teacher assessment through responses to video prompts. Also, allows the instructor to make, choose and randomize prompts as find and review all user uploaded content.

Background and Related Work

a. Background

The Background section is attached

b. Related Work

HTML5 Video + Audio Recording Component

This project was implemented in order to present the capabilities of the GetUserMedia() function that was implemented upon the release of HTML5. It captures content from a user's input devices, records it, and uploads the content to a media server. It, however, is different from our project because the HTML5 Video + Audio Recording Component project was not meant to be very user friendly or to be used by multiple users. Our project goes a step further by implementing the GetUserMedia() function into an entire teaching based system that is to be used by multiple users.

Updated Software Project Plan

(Previous)

Software Development (Elaboration and Construction)

Effort = 6.7 Person-months

Schedule = 6.9 Months

Cost = \$50548

Total Equivalent Size = 1200 SLOC

Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	0.4	0.9	0.5	\$3033
Elaboration	1.6	2.6	0.6	\$12132
Construction	5.1	4.3	1.2	\$38417
Transition	0.8	0.9	0.9	\$6066

Table 1 ^[1]: first section of the previous COCOMO II model

Software Effort Distribution for RUP/MBASE (Person-Months)

Phase/Activity	Inception	laboration	Construction	Transition
----------------	-----------	------------	--------------	------------

Management	0.1	0.2	0.5	0.1
Environment/CM	0.0	0.1	0.3	0.0
Requirements	0.2	0.3	0.4	0.0
Design	0.1	0.6	0.8	0.0
Implementation	0.0	0.2	1.7	0.2
Assessment	0.0	0.2	1.2	0.2
Deployment	0.0	0.0	0.2	0.2

Table 2 ^[1]:second section of the previous COCOMO II model

Table 1 breaks down the cost in dollars, required to complete the project. The cost is then further broken down to shown the cost of each stage of development. These are the best assumptions our group can make at this time as to how long the project will take, along with how many lines of code will be needed.

Table 2 breaks down all the stages of development into the required person months in order to complete the project.

(Updated)

Software Development (Elaboration and Construction)

Effort = 3.3 Person-months

Schedule = 5.5 Months

Cost = \$10625

Acquisition Phase Distribution

Phase	Effort (Person-months)	Schedule (Months)	Average Staff	Cost (Dollars)
Inception	0.2	0.7	0.3	\$638
Elaboration	0.8	2.0	0.4	\$2550
Construction	2.5	3.4	0.7	\$8075

Transition	0.4	0.7	0.6	\$1275
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Table 3 ^[1]: first section of the updated COCOMO II model

Software Effort Distribution for RUP/MBASE (Person-Months)

Phase/Activity	Inception	Elaboration	Construction	Transition
Management	0.0	0.1	0.3	0.1
Environment/CM	0.0	0.1	0.1	0.0
Requirements	0.1	0.1	0.2	0.0
Design	0.0	0.3	0.4	0.0
Implementation	0.0	0.1	0.9	0.1
Assessment	0.0	0.1	0.6	0.1
Deployment	0.0	0.0	0.1	0.1

Table 4 ^[1]:second section of the updated COCOMO II model

Table 3, gives the breakdown of cost based off of the revised Lines of Code (LOC), along with revised person months required to complete the project. The cost of development is expected to decrease after further refining the number of LOC required.

Table 4 gives an updated listing of the person months required to complete the project. The expected times changed due to a better understanding of the project requirements after having started development.

Updated Requirements/Analysis Models

a/b. Updated Diagrams with supporting text

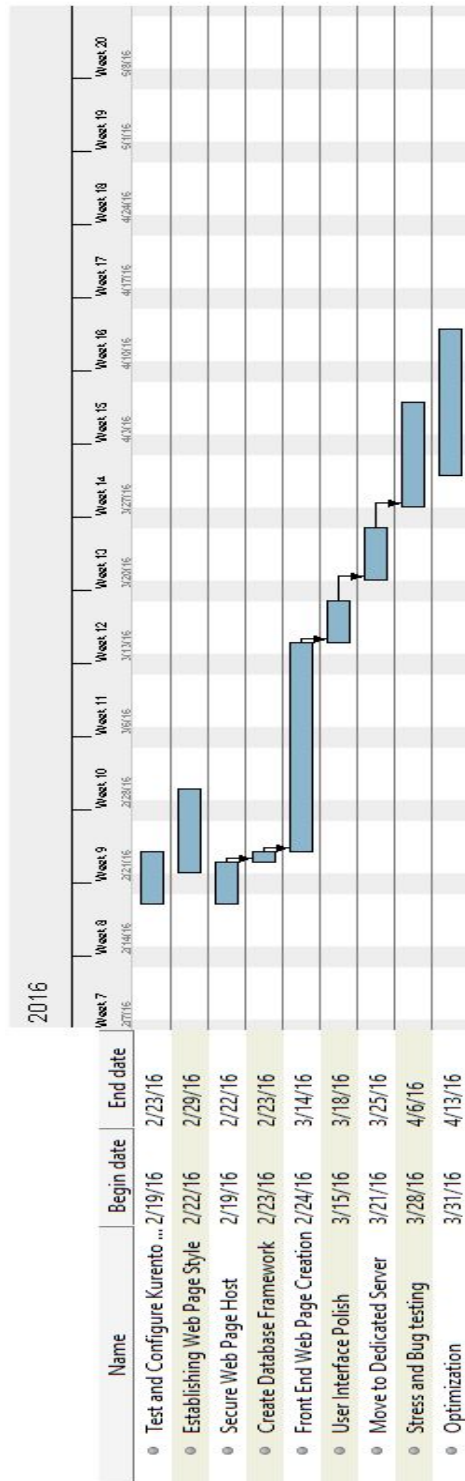


Figure 1 : Project Schedule ^[2]

Figure 1 is a detailed breakdown of the work that needs to be done along with a timeline of when each part needs to be completed. Most of the parts of the project can't be completed until the previous project piece has been finished.

This project flow requires that each piece stay on schedule so as to not push the project deadline back, as well as, to keep the project moving forward smoothly.

Task	Daniel Baggott	Daniel Silveri	Darryl Papke	Matthew Canton
Project Description	X			X
Project Objectives				X
Success Criteria				X
Resource Estimation				X
Cost Estimation				X
Project Schedule	X			
Responsibility Matrix			X	
Risk Planning			X	
GANTT/PERT Chart	X			
Management/Technical Constraints			X	
Project Monitoring	X			
Use Case Diagram		X		
Activity Diagram				X
Requirements Class Models			X	
Data Dictionary			X	
Non-Functional Requirements		X		
Tools Used		X		
Bibliography		X		
Product Testing		X		
Quality Assurance		X		
Software Design			X	
Project Management	X			

Customer Relations	X			
Implementation	X	X	X	X

Figure 2: Responsibility Matrix

Figure 2 represents the responsibilities delegated to each team member to complete during the software development process.

Use Case Name: Create New Assignment

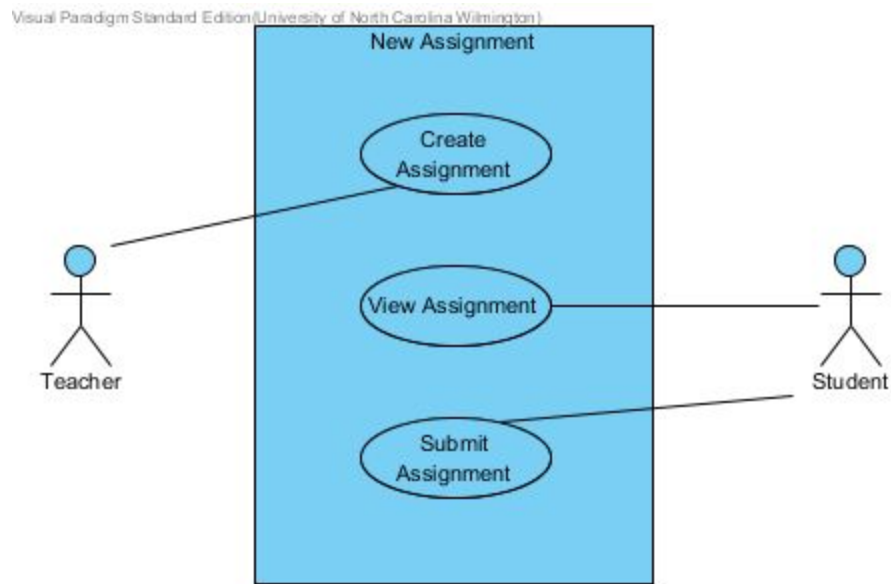


Figure 3: Use case diagram for creating an assignment

Stakeholder Interest:

- Teachers: Need to upload new assignments for students to complete.
- Students: Receive new assignment instructions for completion.

Main Scenario:

1. Teacher logs on to account
2. Teacher chooses the upload assignment option
3. Teacher enters specifications for the new assignment
4. Teacher makes the assignment available to students
5. Teacher Logs out
6. Student views the new assignment
7. Student completes and submits assignment for grading.

Exceptions:

1. Teacher Removes Assignment
 - a. Teacher decides the assignment is unnecessary
 - b. Students are notified of the cancellation
2. Teacher Attempts to Upload an Unsupported file
 - a. Teacher will be notified the file was not accepted
 - b. Teacher can recreate the assignment

Non-Functional Requirements

1. Student should be able to view the assignment
2. Teacher should be able to remove assignment

Use Case Name: Grade Assignment

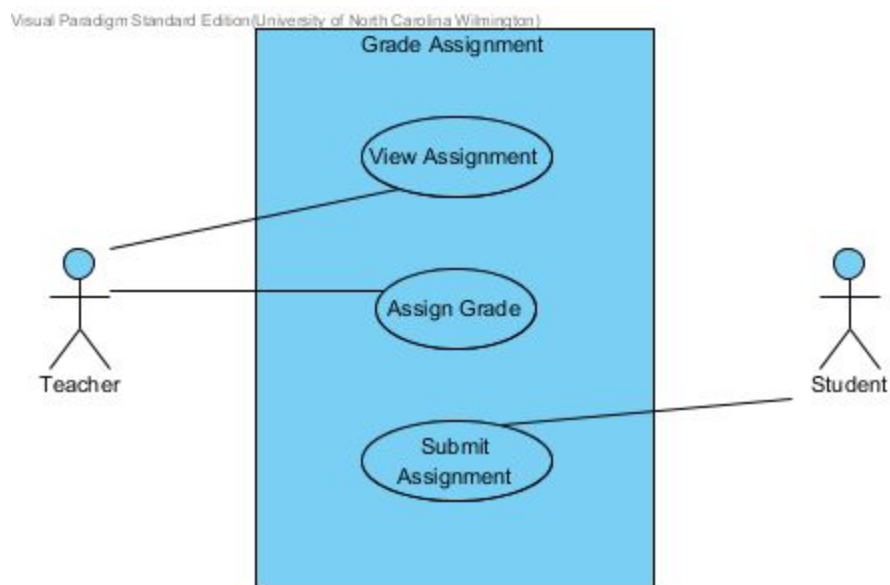


Figure 4: Use case diagram for grading an assignment

Stakeholder Interest

- Teacher: Need to view and grade assignment submissions by students
- Student: Need to submit assignment for grading by the teacher

Main Scenario

1. Students completes and submits an assignment

2. Teacher opens the submitted assignment
3. Teacher reviews the body of work by the student
4. Teacher assigns grade
5. Teacher makes the grade viewable to the student

Exceptions

1. The student's submission is empty/wrong assignment
 - a. The teacher can inform the student of the mistake
 - b. Grade assignment after resubmission

Non-Functional Requirements

1. Teacher should be able to view student submissions
2. Teacher should be able to assign grade to student
3. Student should be able to submit assignment

Use Case Name: Chat Room

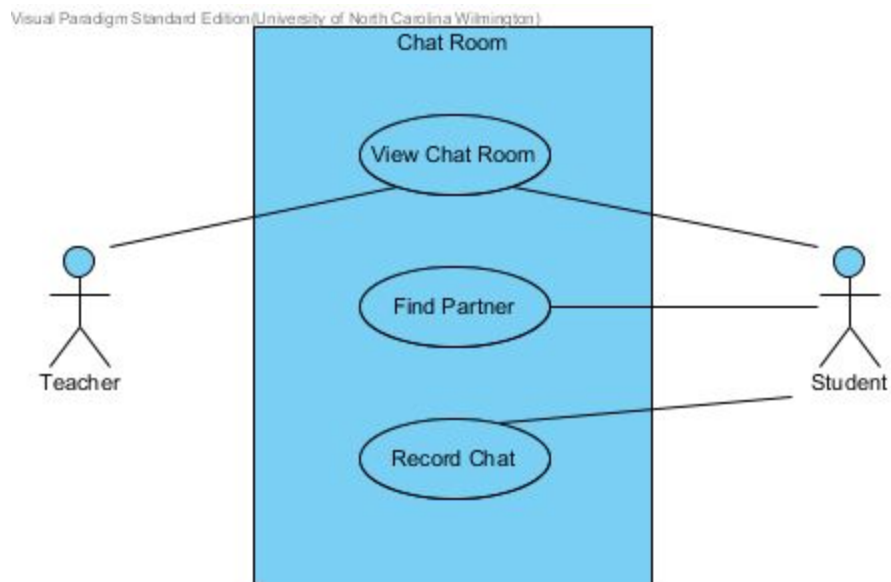


Figure 5: Use case diagram for use of chat room

Stakeholder Interest

- Student: Need to use chat room to find partner and record chat
- Teacher: Need to be able to view student behavior in chat room

Main Scenario

1. Student logs into/signs up for account
2. Student chooses the chat room option on dashboard
3. Student opens new chat room
4. Student finds a chat partner
5. Students practice speaking second language
6. Student makes recording of conversations

Exceptions

1. The student can't find a chat partner
 - a. Return to dashboard
 - b. Create new chat room by clicking on the chat room option

Non-Functional Requirements

1. The student should be able to find chat partner in a few minutes
2. The student should be able to record conversations

Use Case Name: Students Upload a Conversation

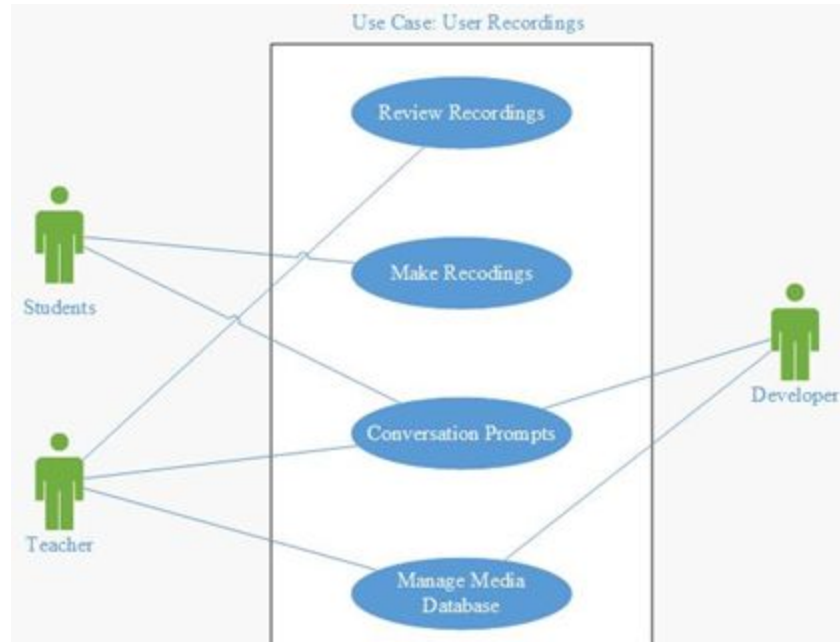


Figure 6: Use case diagram for user recordings

Stakeholder Interests:

- Students: Need to upload conversations in response to the prompts
- Teacher: Wants to review student's uploaded conversations and add conversation prompts
- Developer: Needs to manage all conversation storage on media server.

Main Scenario

1. Student logs on to account
2. Student chooses a conversation prompt that they would like to respond to
3. Student records their response via webcam and microphone
4. Recording is uploaded to media server
5. Student Logs out
6. Teacher chooses a recording to grade based on its accuracy to the prompt
7. Grade is posted to the student's account

Exceptions

1. Media Server is Full
 - a. student cannot upload recording
 - b. developer is notified to free space
2. Student Cannot Log into Account
 - a. student is prompted to reset password
 - b. student logs into account with new password

Non-Functional Requirements

1. Student should be able to upload video within 2 minutes
2. System should be able to handle 200 users
3. Student should be able to find a prompt within five seconds

Risks	Catego ry	Probabilit y	Impac t	RMMM
Group Member Loss	ST	10%	1	Mitigation: Keep all information related to the project open among team members to prevent loss of important details. Management: Redistribute responsibilities.
Client Not Satisfied	CL	40%	2	Mitigation: Give client updates on the project often. Management: Fix any issues that have been brought up by the client.
Computer Breaks	TE	15%	2	Mitigation: Keep important files on multiple machines. Management: Team member will buy new computer or use a school computer.
Webcams Will Not Be Available for Testing	TE	20%	2	Mitigation: Find a reliable source that has webcams available or computers already equipped with webcams.
Project Size	PS	40%	3	Mitigation: Discuss features that may be out of reach given our time constraint. Management: Cut features that would not be delivered to lessen upcoming work.
Unable to Find Video Solution/ Save Solution	TE	25%	2	Mitigation: Find solution early for saving/ video needs. Management: Meet with client for further instruction on needs

PS - Project Size Risk BU - Business Risk CL - Client Risk TE - Technology risk

ST - Staff Risk

Impact Values: 1 – Catastrophic 2 – Critical 3 – Marginal 4 – Negligible

Table 5 : Risk Plan

Table 5 is the original risk analysis that our group came up with when starting the project. The biggest concerns going into the project was starting a project that was too large and ambitious for our group to finish in the given amount of time. We also calculated that there could be a high chance of the client not being satisfied with our design, as well as, the project size being too big.

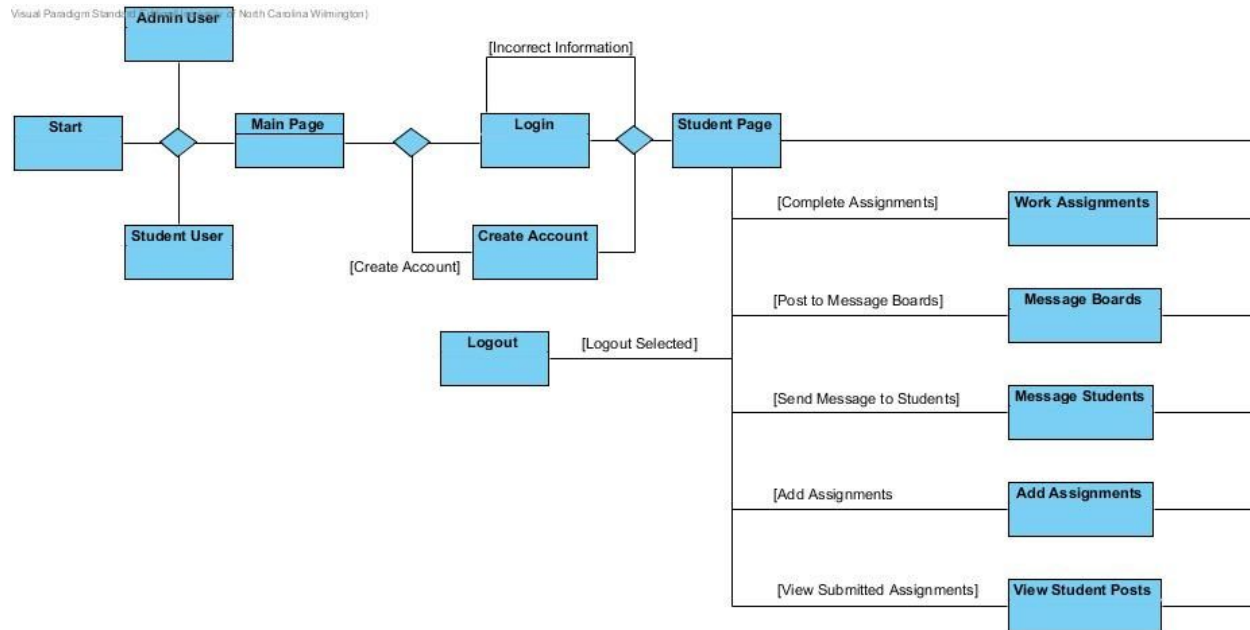


Figure 4: Website Activity Diagram

Figure 4 shows the actions that can be taken by both a teacher and a student. The diagram shows the flow also of how to reach each action.

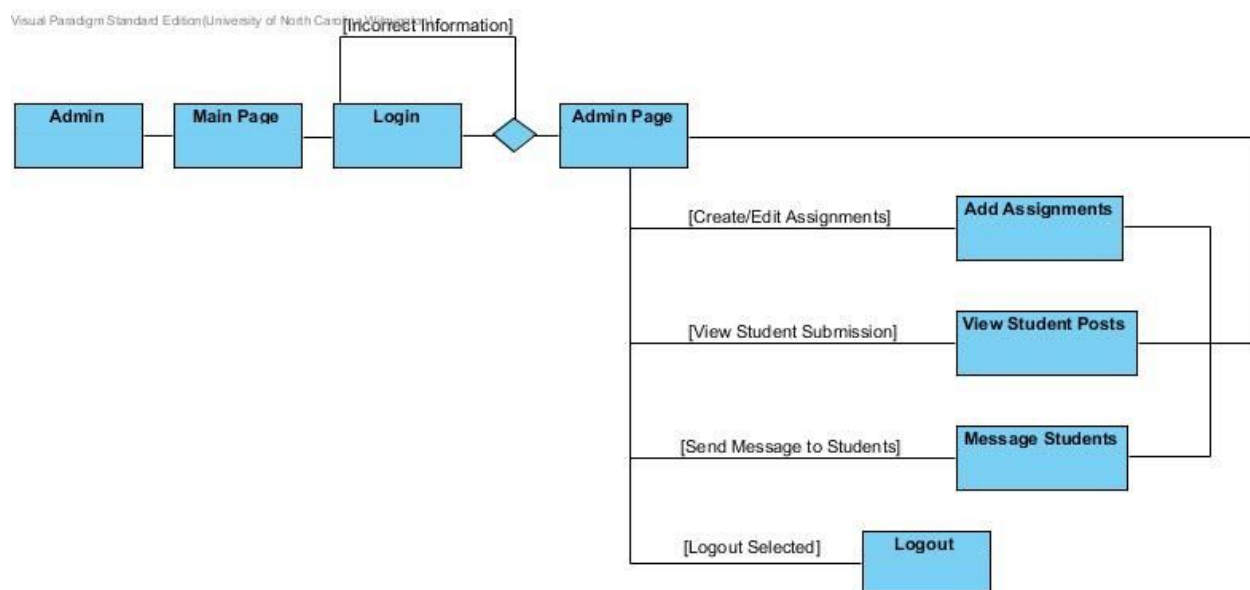


Figure 5: Admin Website Activity Diagram

Figure 5 shows the actions that can be taken by both a teacher/administrator and the flow of how to reach those actions.

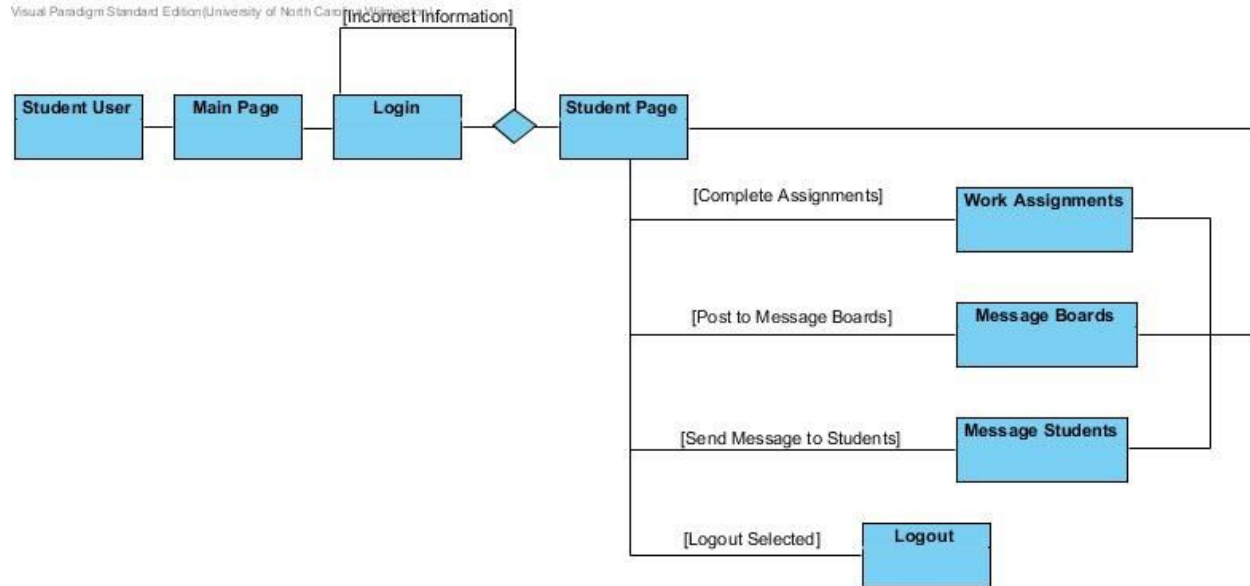


Figure 6: Student Website Activity Diagram

Figure 6 shows the actions that can be taken by a student and the flow of how to reach those actions.

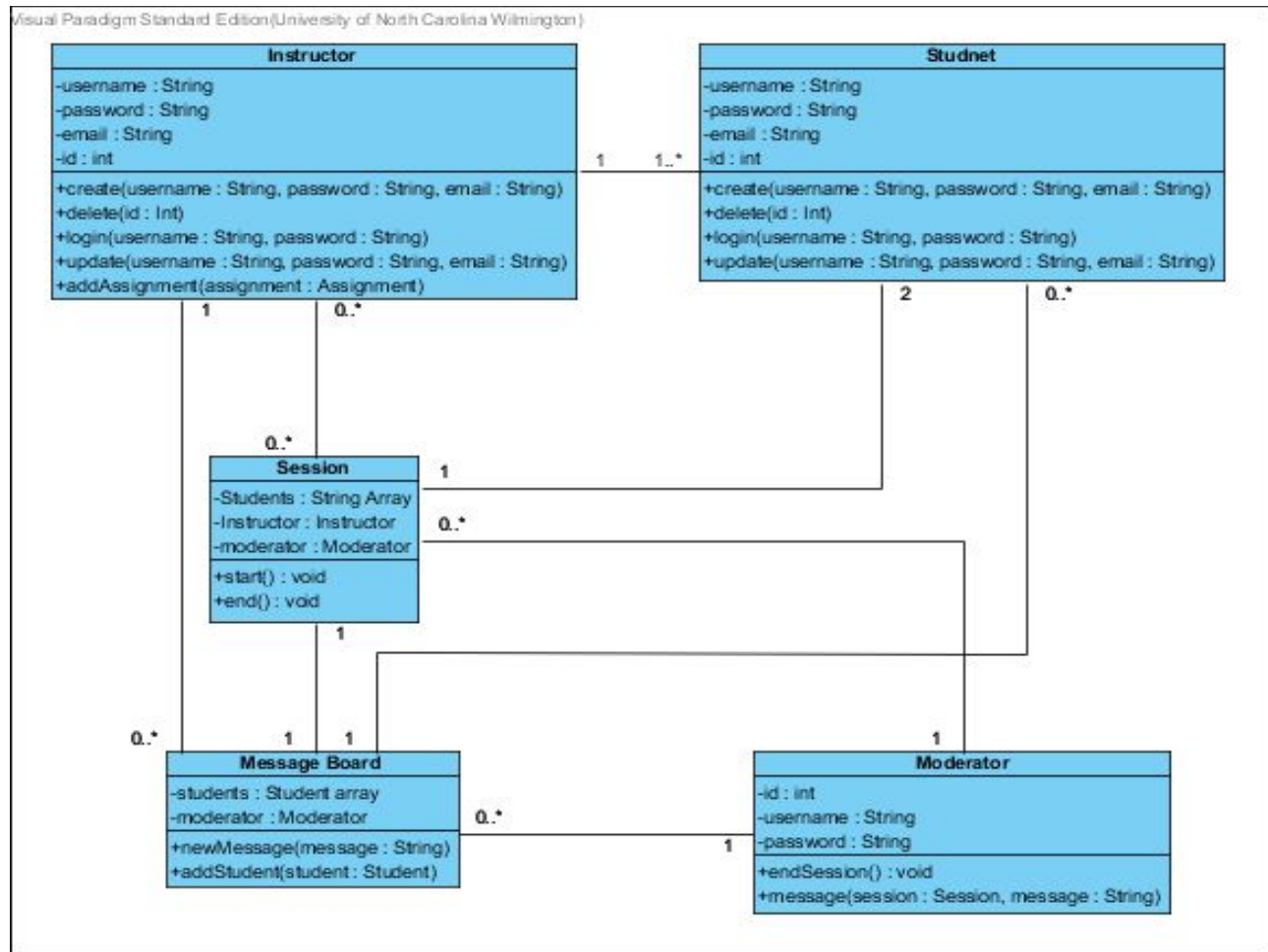


Figure 7: Student Website Class Model

Figure 7 displays the class diagram for our software. The moderator class is shown in the diagram but may not make it into the last iteration of the software.

c. Non-Functional Requirements

The non-functional needs for our project are; ease of use, concern for security, and performance/efficiency of the website.

The first requirement, ease of use, will be a big part of the design process. As multiple students of differing cultural and lingual backgrounds will be using the website, a need for a simplistic design is important. One way of testing the use of the website is to get outside testers who are not familiar with the website. This will allow us to receive feedback on the design and usability. With this feedback, we can further flush out the design for optimal use.

Another big concern that needs to be addressed in the security of the website. The database for the website will contain sensitive information of each user. It is our priority to ensure that all information is kept private and inaccessible to unauthorized users. A solution to this problem would be to encrypt all information that is stored in our databases. This will ensure that even if there is a breach in security, no information would be gathered that would be of use.

The last concern that will need to be addressed is the performance and efficiency of the website. Due to the nature of the work being carried out - with recording audio/video, message boards, and other assignments - there is a need for the website to run smoothly and quickly. This will ensure that the client and the users will be satisfied with the product, and will have them come back to our software on a regular basis. This task will be handled by making sure that the video conferencing features can work across multiple networks with varying degrees of Internet speed. There will also be work put into the database side of the website, making sure that the connection remains stable and can handle the amount of traffic that the website is designed for.

d. Software Functions/Sub-Functions

1 - Video Conference

1.1 - Video Recording

1.2 - Audio Recording

1.3 - Upload Audio/Video to Server

2 - Message Boards

2.1 - Create New Message Boards

2.2 - Reply to Previous Message Boards

2.3 - Update/Delete Messages

3 - Teacher Assignments

3.1 - Teacher Creates New Assignments

3.2 - Teacher Has Access to Uploaded Assignments

3.3 - Students Have Access to Assignments

3.4 - Students Complete and Upload Assignments

4 - Account Creations

- 4.1 - Teachers Can Create New Accounts
- 4.2 - Teachers Can Delete Accounts
- 4.3 - Students Can Create New Accounts
- 4.4 - Students Can Delete Accounts

Design Models

a. General Design Constraints

- **Multimedia solutions must be native browser compliant and widely accepted**
- **Cell Phone eventually planned, consideration must be kept in mind**
- **Bandwidth and Storage space**
- **Must consider and alleviate system abuse (system strain under DDOS, MySql injection...)**
- **Design must be pleasing and easy to understand for multiple cultural palets.**

b. Architectural Design



Figure 8: Interactive Interface Architecture Design

Figure 8 is used to represent how the user interface interacts with the server. The Interactive Interface architecture is used due to its use of a user input that is then updated on a receiving computer system. The output is based off of another user's input. The drawback is if there is lag or other disruptions in the system.

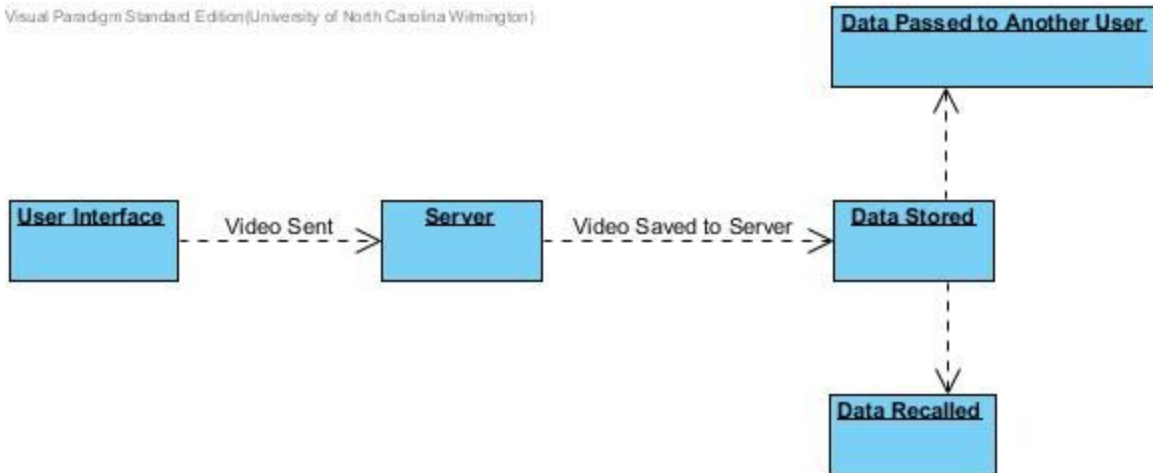


Figure 9: Real-time System Architecture Design

Figure 9 shows how video sent from the user interface will be stored on the server. The Real-Time System will be used due to the storing of video/audio data on a server that will be accessed and passed onto other users in real time. The drawback is the connection speed between the users and the database handling the data.

c. Subsystem Design

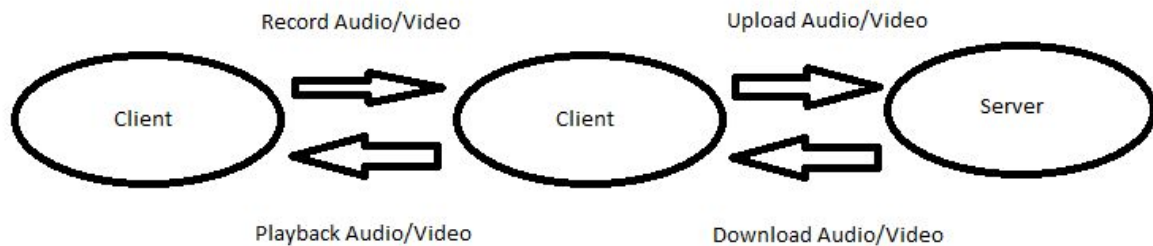


Figure 10: Audio/Video Subsystem

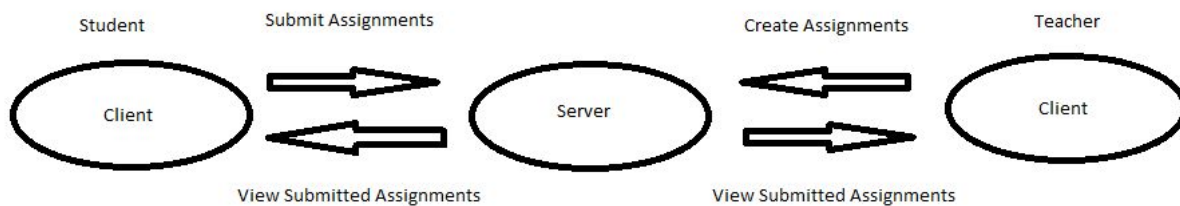


Figure 11: Assignment Subsystem

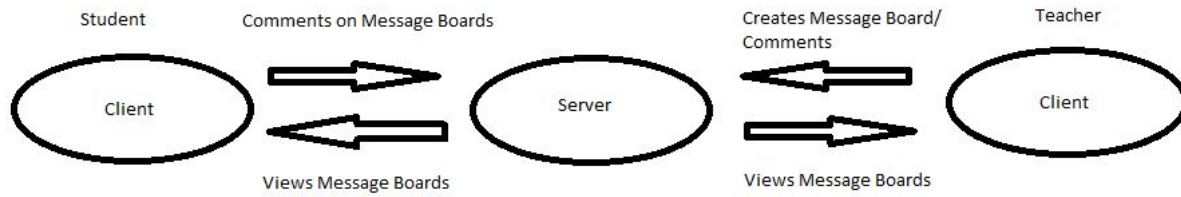


Figure 12: Message Board Subsystem

d. Solution Focused Activity Diagrams

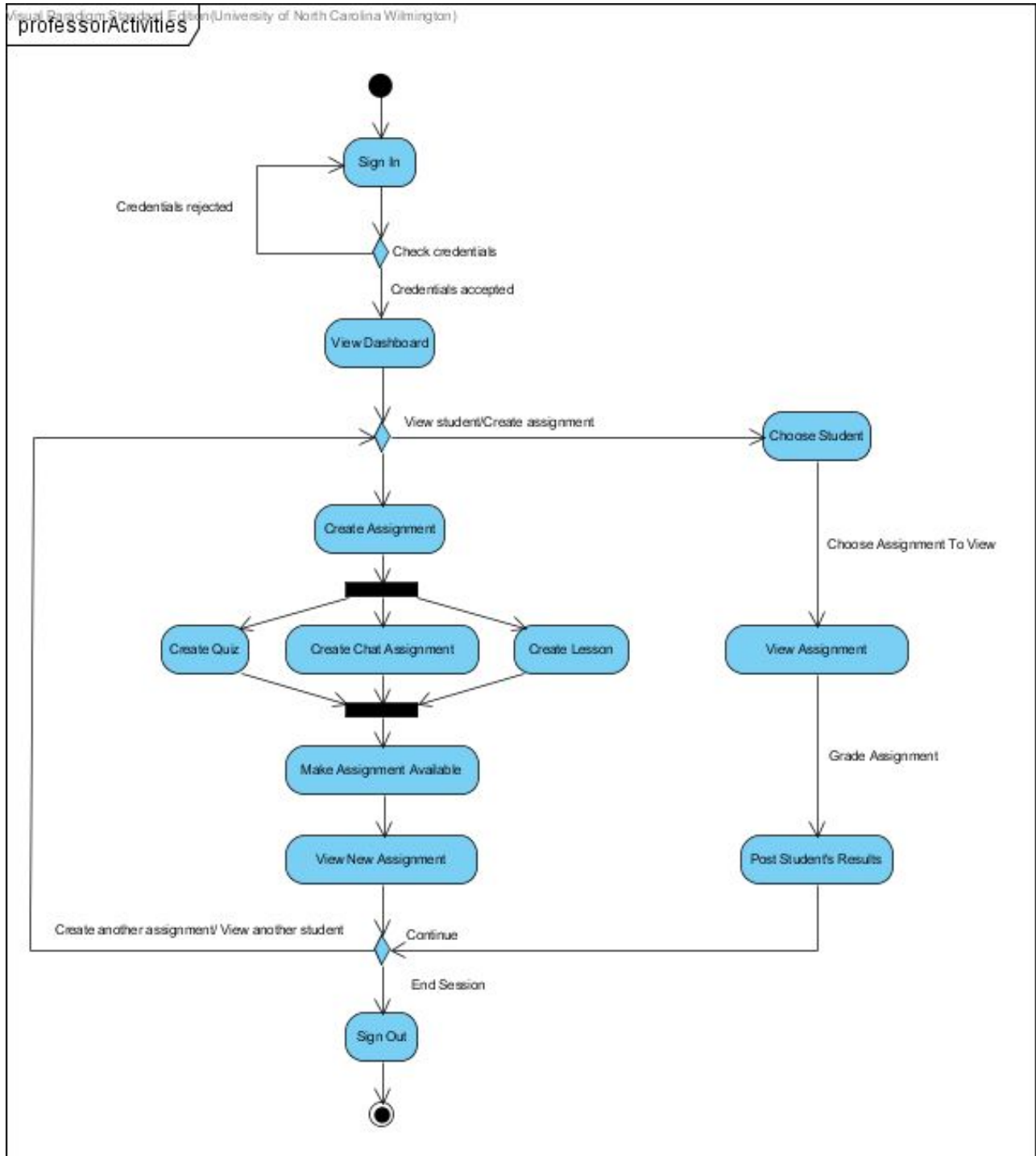


Figure 13: Professor Activities Activity Diagram

Figure 11 is the updated teacher solution focused activity diagram. The parts that were changed involved the teacher submissions. Our project so far has condensed the submissions so that there are only picture prompts for the students assignments. Previously planned was the ability for the teacher to upload video prompts, so as to help teach

the proper pronunciation of the Japanese language. However, due to time constraints this feature was left out in favor of the picture prompt.

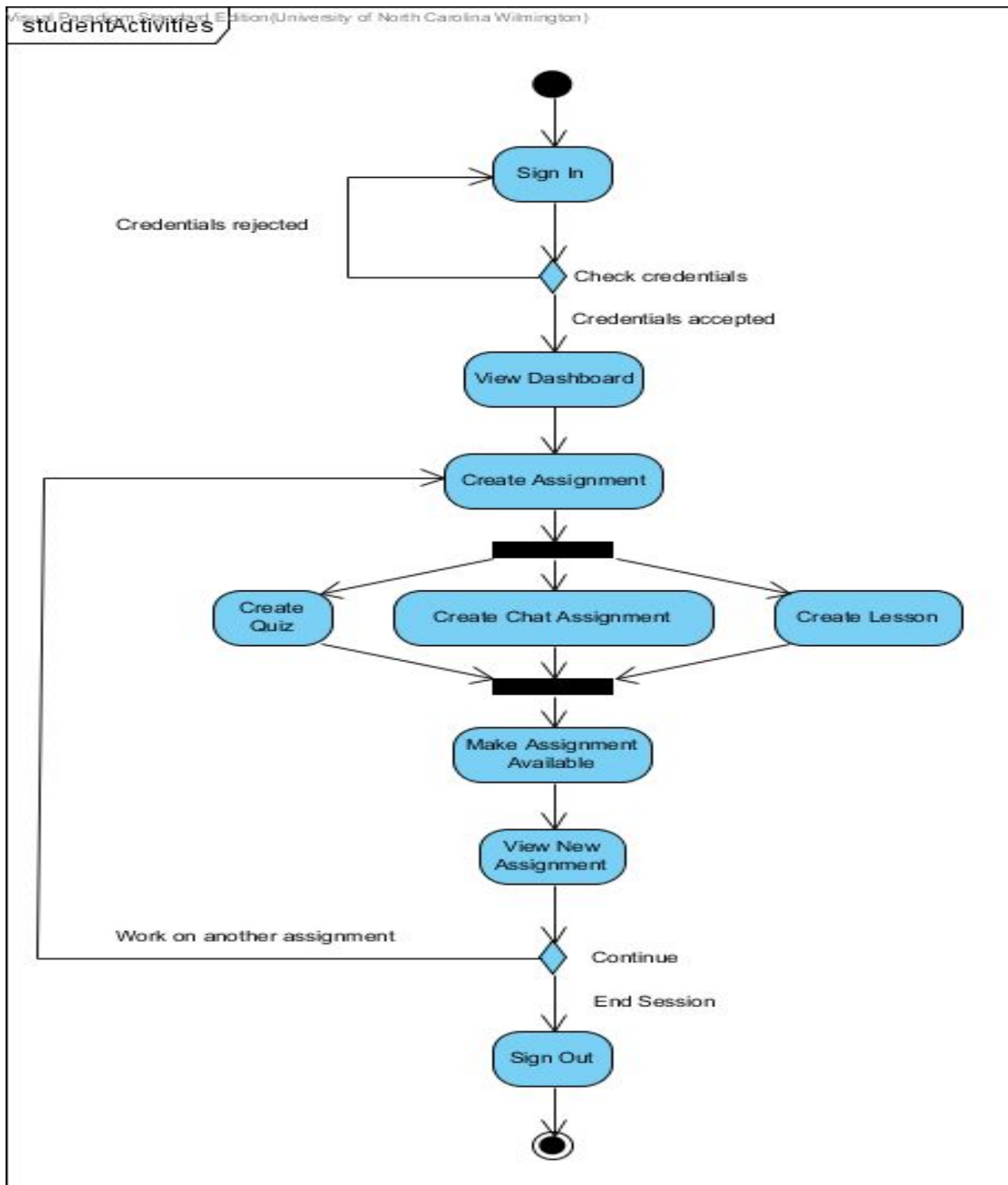


Figure 14: Student Activities Activity Diagram

Figure 14 is an updated version of the student solution focused diagram. The parts that were changed involved removing some of the assignment types that the student can complete. The video assignments, as well as the quiz assignments have been removed for just a picture prompt that the students will take. This has been adjusted to reflect the state of the project that has currently been developed.

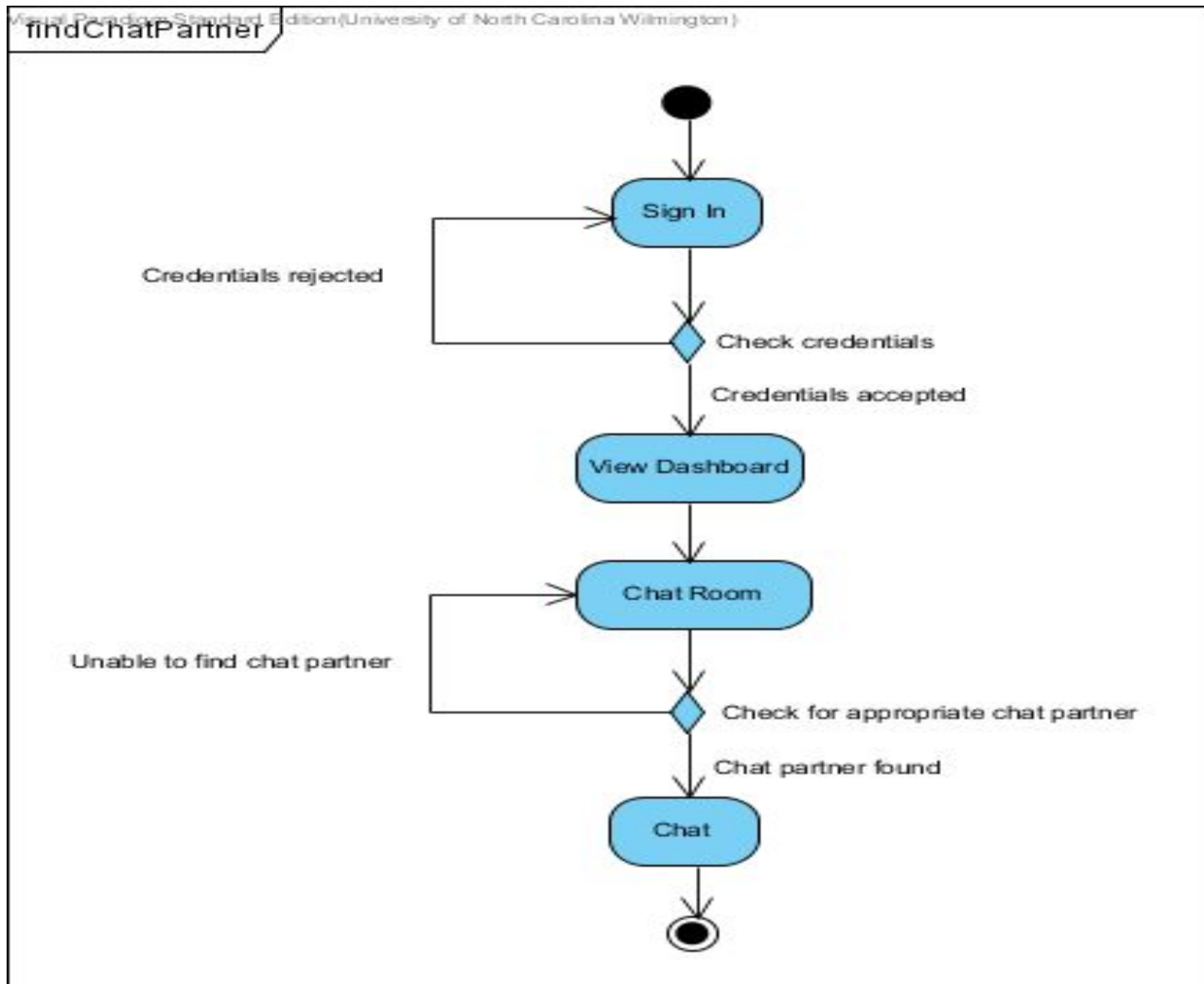


Figure 15: Find Chat Partner Activity Diagram

e. Sequence Diagrams

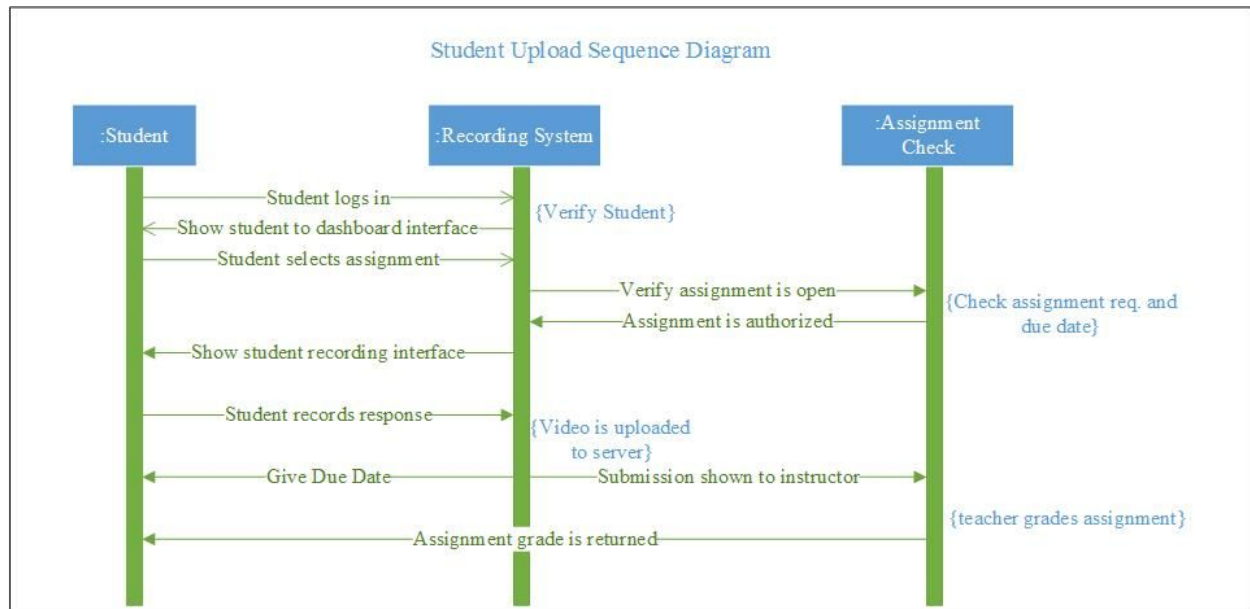


Figure 16: Upload Submission Sequence Diagram

Figure 13 is a sequence diagram for the steps involved in the student uploading a video submission. The student begins by logging in and is directed to the student dashboard, then the student will select the assignment that needs to be completed. From here the student will record up to three submissions, where the student will select one to submit. The file is then uploaded to the server and the teacher is able to grade the submission.

f. State Diagrams

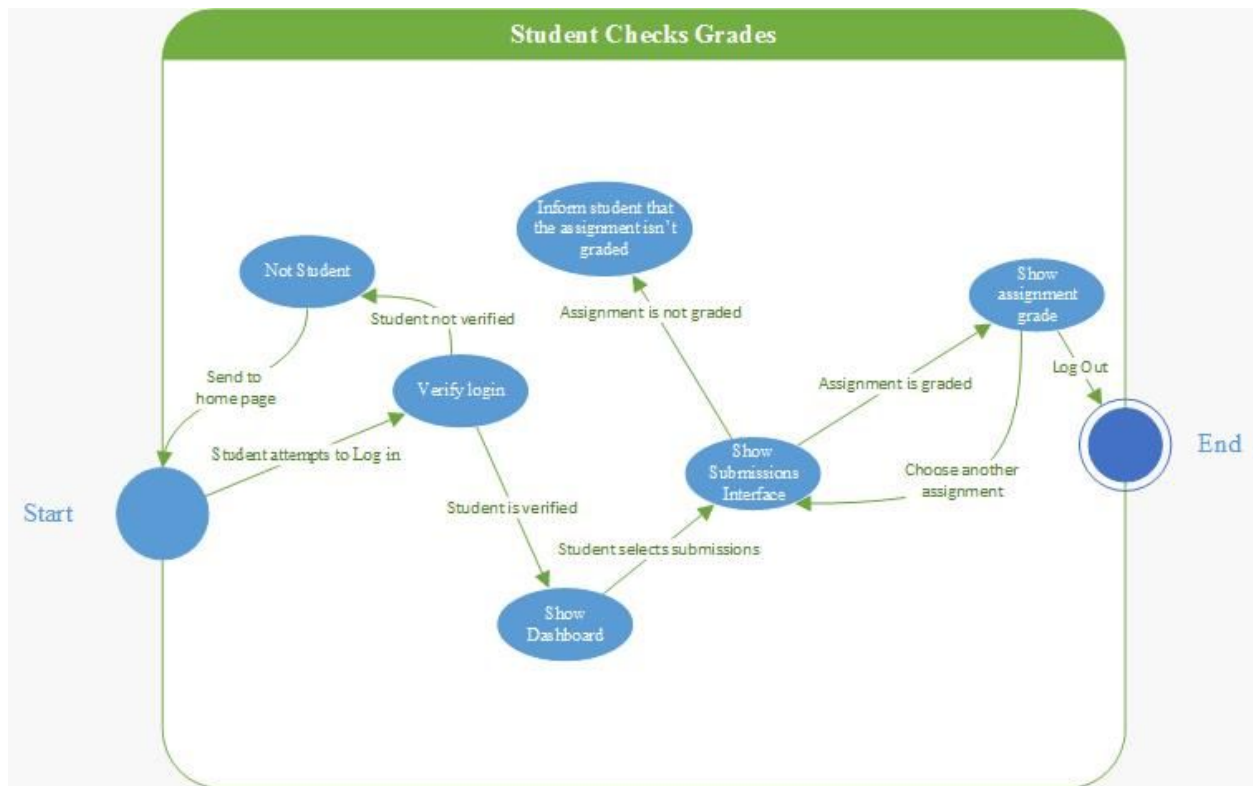


Figure 17: Student Check Grades State Diagram

Figure 17 show the state diagram for how students access their accounts and view their grades. The student begins by logging into their account, after doing so they are directed to their dashboard. From there, the student goes to their submission tab and can view the status of their submitted assignments to check if they have been graded or not. From there the student can continue browsing the website , or they can log out if they are finished.

g. User Interface Design

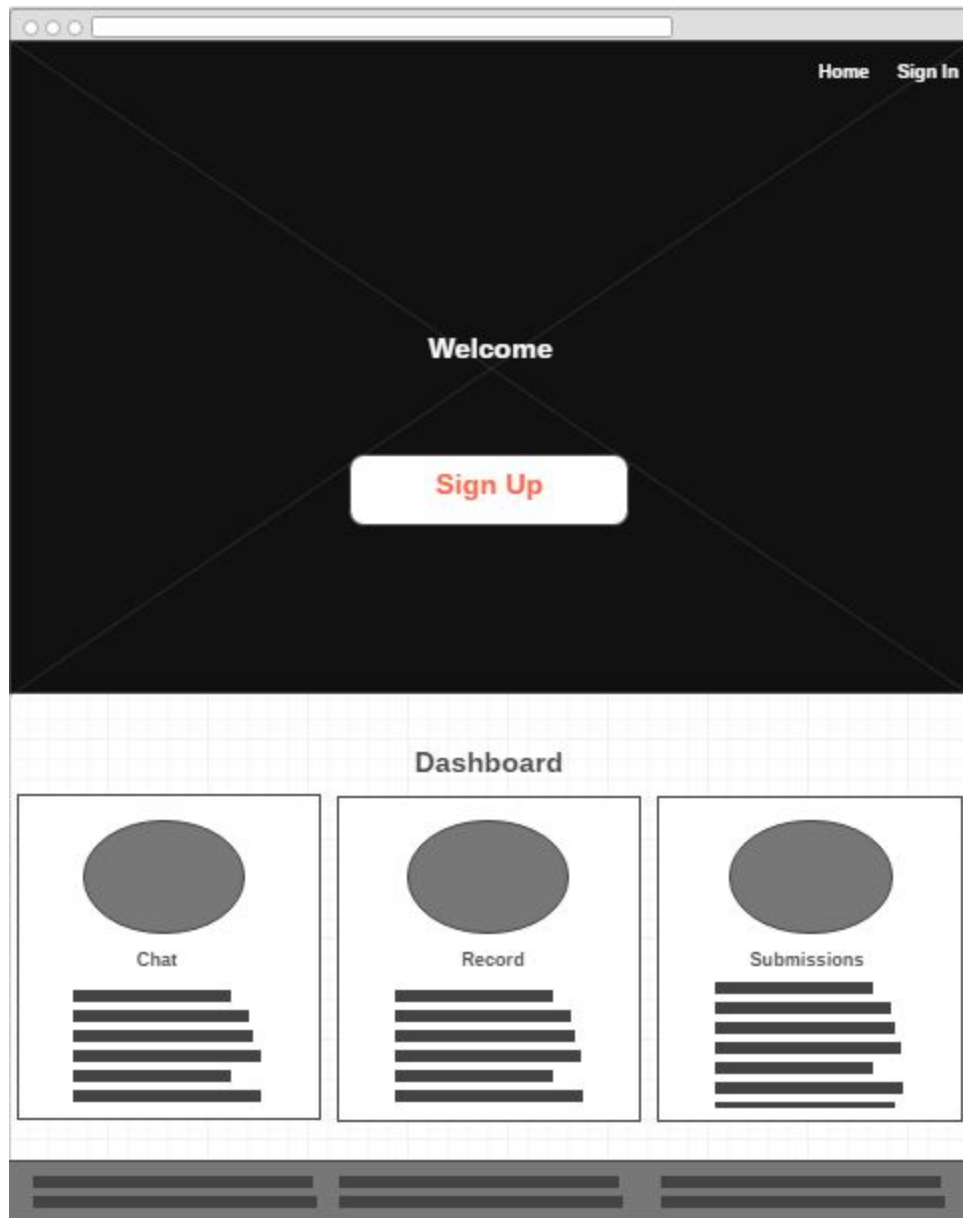


Figure 18: User Interface Design-Home Page

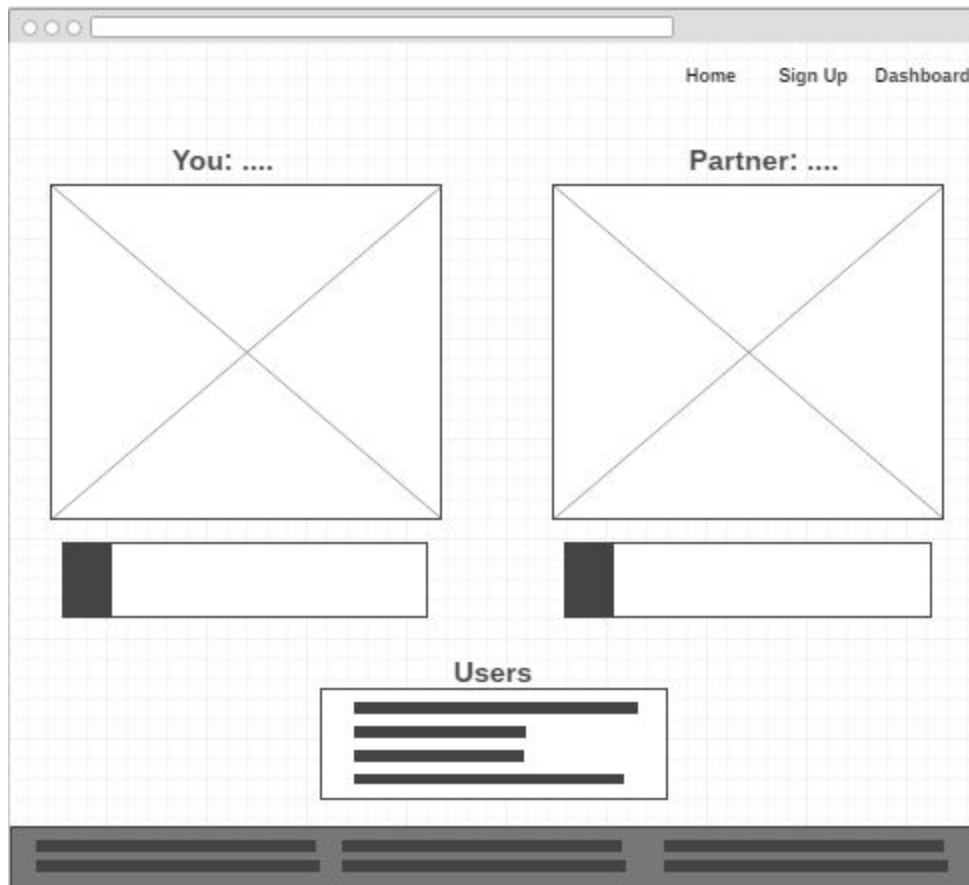


Figure 19: User Interface Design-Chat Page

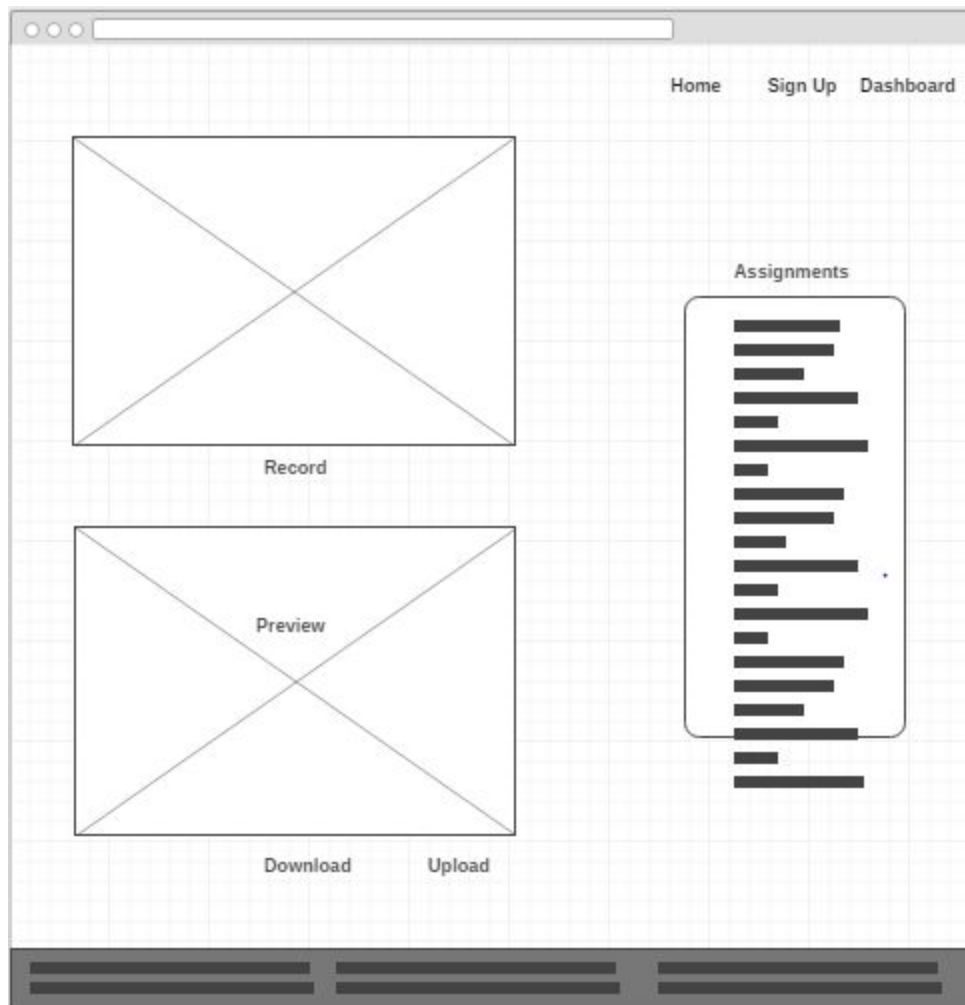


Figure 20: User Interface Design-Record Page

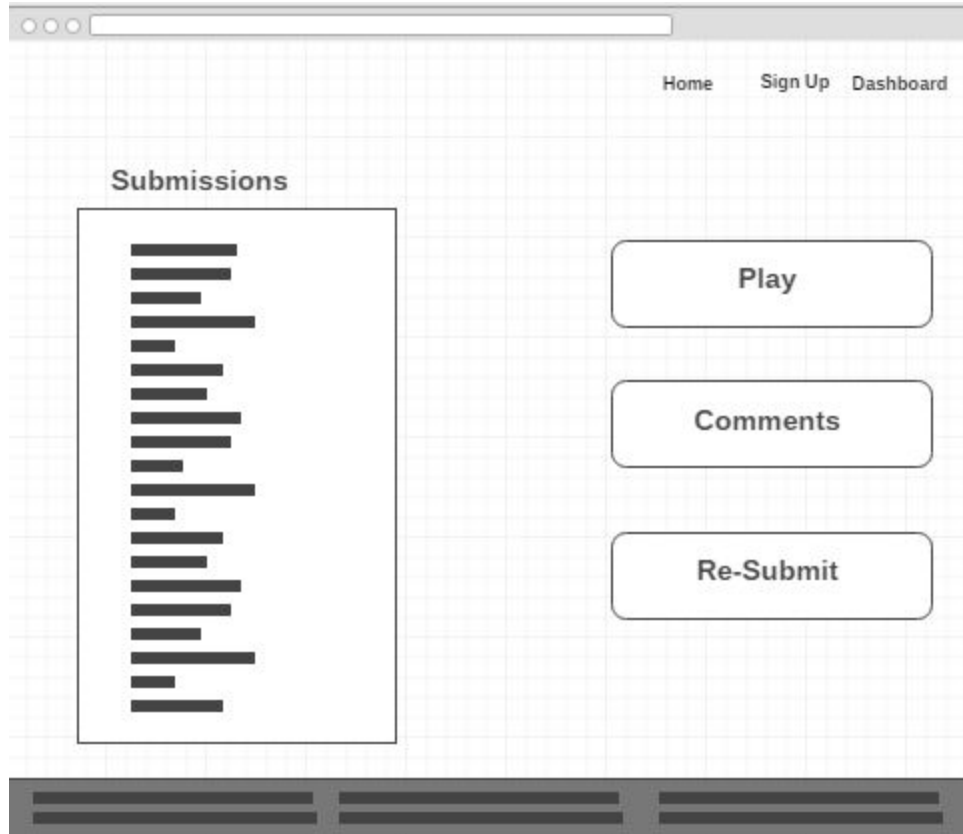


Figure 21: User Interface Design-Submissions Page

Updated Data Dictionary

Teacher User – A user who can create video prompts for video practice. This user can select a set of video prompts for a video practice set. Can review associated student users response video. A teacher user can review Student's video practice and text messages.

Student User – A user who can send text messages to opposite native language student users. This user can real time video chat with opposite native language student users. This user can respond to a video practice set creating a response video.

Native Language – The user's native language, Japanese or English.

Login – The ability to sign in to student or teacher user and gain access to appropriate functionality and associated stored content by user type and past interactions.

Logout – The ability to sign out and remove access to user association.

MCU Server – A multipoint control unit is a video conferencing server capable of recording and mixing live video streams.

Dashboard – A page accessed after login from which appropriate functionality and stored content can be accessed according to user type student or teacher.

Video Prompt – A teacher created video that allows students a response time which is recorded as a response video.

Response Video – The student user's recording of the response time after a video prompt. This video is tagged with the associated video prompt.

Text Message – A text message that can be sent to opposite native language speakers which is stored and can be accessed later. A two way chat.

Video Chat – A live two way video chat recorded by the server.

Video Practice Set – A set of video prompts which can be responded to by users creating response videos.

Edit User Info – The ability to edit user information such as Email and password.

Section - Either video response, video chat, or lessons

Tools

- Wireframe.cc
- Google Documents
- Gannt Project
- Visual Paradigm
- Microsoft Visio 2013
- Web Browser
- Slack
- CSSE COCOMO II- Constructive Cost Model

Design Process

While developing the design of our system we looked at other foreign language teaching websites, as well as included Ms. Kano in designing the user interface for the system. All design processes were developed together in the CIS building or from a remote location due to many schedule conflicts. Tasks were assigned equally amongst our group in order to set an equal work-load for everyone in the group.

Task	Daniel Baggott	Daniel Silveri	Darryl Papke	Matthew Canton
Project Description	X			X
Project Objectives				X
Success Criteria				X
Resource Estimation				X
Cost Estimation				X
Project Schedule	X			
Responsibility Matrix			X	
Risk Planning			X	
GANTT/PERT Chart	X			
Management/Technical Constraints			X	
Project Monitoring	X			
Use Case Diagram		X		
Activity Diagram				X
Requirements Class Models			X	
Data Dictionary			X	
Non-Functional Requirements		X		
Tools Used		X		
Bibliography		X		

Product Testing		X			
Quality Assurance		X			
Software Design				X	
Project Management	X				
Customer Relations	X				
Implementation	X	X	X		X

Figure 22: Responsibility Matrix

Figure 22 represents the responsibilities delegated to each team member to complete during the software development process.

Major Problems Encountered

- Time management: between each of our schedules it was difficult to accurately predict the amount of work that would actually get done.
- Understanding blob structure and how to interface integrate them with the database.

Project Testing/Validation

a. General Testing

The testing approach that will be implemented with our software is the Black-box testing. This will work best for us as this will give us important feedback on how the website runs and how easy the website is to use. The given feedback will allow for us to make any corrections to the software, such as; bugs, non-user friendly web page design, and whether or not the requirements have been met.

b. Test Cases

Test Case 1: Functionality of website

Expected Outcome: The Website is easy to use and intuitive. Little, if any, instructions are required to be given when operating the website for the first time.

Test Case 2: Bugs present within website

Expected Outcome: The website contains only a few bugs that can be easily and quickly fixed.

Test Case 3: Testing of Video/Audio capabilities

Expected Outcome: The website is able to perform the required video/audio functions without any lag or dropping of connections, as well as record and upload video/audio to a server.

c. Non-Functional Requirements

Our project is a website that will be used as an educational platform. This means that the website will need to be easy to use. This will be important to help the learning process, and not be a hinderous to the students. The website will also be used by non-native speaking English students, which increases the need for an easy to use and navigable website.

The next concern is security. This website will be used by multiple students, which means each student will have their own personal login username and password. There will also be an administrator, usually a teacher, that can moderate the website to ensure that everything is secure and problem accounts can be removed if necessary. General unsafe code practices in languages such as SQL will be avoided.

Our website will rely heavily on audio and video components. This puts a great of concern on the performance and efficiency of the website. Ensuring that the videos and audio run smoothly will greatly increase the student's ability to learn using the website.

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