

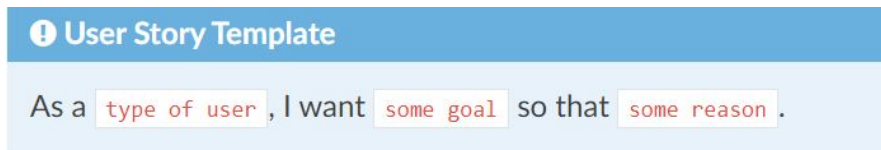
Milestone 3

Part A - User Stories

Students:

Usability:

1. As an elementary-aged student, I want to be able to easily join the Zoom meeting, so that I can attend class.
2. As an elementary-aged student, I want to be able to easily learn and use Zoom's meeting features, so that I can communicate with my teacher and peers without my parents' help.
3. As an elementary-aged student, I want to interact with Zoom through mouse inputs, so that I am not forced to use the keyboard if I cannot type.



Engagement:

1. As an elementary-aged student, I want to be able to play multiplayer, mouse clicking games, so that I will want to stay in the Zoom classroom
2. As an elementary-aged student, I want to be able to use a whiteboard, so that I have more options to interact in the meeting.
3. As an elementary-aged student, I want to be able to watch a video during class, so that I can see what we are learning instead of just listening.

Socialization:

1. As an elementary-aged student, I want to be able to see chat bubbles in the chat, so that I can distinguish which person said what more easily.
2. As an elementary-aged student, I want my chat messages to be aligned on the right of the chat, so that I can easily identify my own chat messages.
3. As an elementary-aged student, I want to be able to highlight my name in a specific color, so that I can identify myself and my chat messages in the Zoom meeting.
4. As an elementary-aged student, I want the ability to pick an image/icon to appear next to my name, so I can easily identify myself and others in the Zoom meeting.

Teachers:

Engagement:

1. As a teacher, I want to be able to share videos and movies with my students, so that I can keep them engaged with the material.

2. As a teacher, I want the ability to allow my students to play multiplayer, mouse clicking games through Zoom, so that I can maintain control of the class, and keep the students engaged.
3. As a teacher, I want the ability to remove or restrict the option for students to change their virtual background, so that I can decrease distractions.
4. As a teacher, I want the ability to share interactive presentations with my students, so that I can keep them engaged with the presentation.
5. As a teacher, I want the ability to change the screen names of my students, so that I can decrease distractions and prevent inappropriate screen names.
6. As a teacher, I want the ability to mute my students, so that I can maintain control of my class.
7. As a teacher, I want the ability of granting access to certain participants to share their screens and interactive presentations, so that the class can be more interactive for students.

Socialization:

1. As a teacher, I want to be able to view all students screens' (video or image) during a breakout session, so that I can see which groups/individuals are engaged and on task.
2. As a teacher, I want to be able to read a transcript of students conversations' so that I can understand their needs/questions.
3. As a teacher, I want to be able to distinguish types of messages within the chat, so that I can identify time sensitive information from general messages.
4. As a teacher, I want to be able to assign an image/identifying icon with a student, so that if the student does not have video on, I can easily identify that participant.
5. As a teacher, I want my students' names to be highlighted in different colors, so that I can easily identify different students.
6. As a teacher, I want questions to be highlighted in a specific color, so that I can easily identify and answer those questions in a timely manner.
7. As a teacher, I want my chat comments to be aligned on the right, so that I can easily identify my own chat messages.

Most relevant user stories

1. As a teacher, I want to be able to distinguish types of messages within the chat, so that I can identify time sensitive information from general messages.

Justification: Oftentimes in Zoom meetings, especially those with many participants, chat messages can get lost in a torrent of chat messages. This is certainly the case when a teacher asks a question to class and gets flooded with answers. This can also happen when the teacher asks the class “any questions?” By being able to distinguish different types of messages, such as questions, answers, etc., the teacher will be able to more easily distinguish between different chat messages and respond more efficiently to the chat messages.

2. As a teacher, I want the ability to share interactive presentations with my students, so that I can keep them engaged with the presentation.

Justification: When comparing a plain powerpoint presentation with one that allows for active engagement for students, it becomes apparent that the more interactive presentations would be preferable for elementary-aged students. More interactive presentations will keep students actively engaged in the material, which we identified as being one of the biggest issues with Zoom today regarding elementary-aged students. As a result, a teacher will have more control over their class, and will deliver a more engaging learning experience for their students.

3. As a teacher, I want to be able to view all students screens’ (video or image) during a breakout session, so that I can see which groups/individuals are engaged and on task.

Justification: The current breakout rooms do not afford a teacher to view all groups at the same time. The teacher is only afforded viewing the list of students in each breakout room without seeing or hearing their conversation. Allowing the teacher to view the students’ videos while in breakout rooms affords teachers to monitor their students’ engagement in the activity and have the ability to gauge which rooms might need help first. This is giving the teacher the point of view of being in groups within a classroom since they will be able to view all students at the same time and being able to select which groups to engage with when needed. This was mentioned as a potential improvement to the platform in an interview with teachers and their experiences switching to online learning during the pandemic (LaBarre).

4. As an elementary-aged student, I want to be able to easily learn and use Zoom’s meeting features, so that I can communicate with my teacher and peers without my parents’ help.

Justification: It is no secret that elementary-aged students are not as technically literate as high-school or college-aged students. It is also apparent that Zoom was

not initially designed to be a kid-friendly piece of software. As a result, elementary-school aged students, who for many will be their first time using a computer, will have a difficult initial learning curve with using Zoom. This can be very detrimental to a child's learning experience, as they will fiddling around with trying to join a Zoom meeting, setting up their microphones and cameras to work properly, etc., instead of attending class and learning. By making the experience of learning all of Zoom's different features more easy and accessible for younger students, there will be positive effects towards their education.

5. As an elementary-aged student, I want to interact with Zoom through mouse inputs, so that I am not forced to use the keyboard if I cannot type.

Justification: It's common for elementary-aged children, especially the younger children, to struggle with typing on the keyboard. Motor dexterity may not be as developed for typing and/or hands may be too small to comfortably reach all the keys ("At What Age Are Kids Developmentally Ready for Typing?"). Therefore, there should be alternatives to keyboard inputs that are easily accessible to children.

6. As an elementary-aged student, I want the ability to pick an image/icon to appear next to my name, so I can easily identify myself and others in the Zoom meeting.

Justification: Younger students may find it difficult to identify themselves in the Zoom meeting. They can have difficulty in finding their own chat messages, their own webcam feed, etc., and as a result, can make using Zoom a confusing and difficult experience. If students were given the ability to choose a small icon, such as a racecar or dinosaur, that would show up next to their name in chat messages and webcam feeds, then these students would have an easier time identifying themselves in Zoom meetings, and make the experience much easier.

B. Ideation and Preliminary Designs

Design Ideas

1. As a teacher, I want to be able to distinguish types of messages within the chat, so that I can identify time sensitive information from general messages.
 - a. **Highlight the background of different messages in different colors that display urgency**
 - i. **Question - highlighted in red - very important**
 - ii. **Answer - highlighted in blue - important**
 - iii. **Comments - not highlighted - unimportant.**
 - b. Change the text color of different messages to display the urgency.
 - i. Question - text in red - very important
 - ii. Answer - text in blue - important
 - iii. Comments - black - unimportant
 1. Justification: A different method of distinguishing chat messages. Same reasoning as highlighting the background
 - c. Have different boxes, such as “question,” “comment,” “answer” etc.,
 - i. Before students submit a message, they must select the appropriate box for their message
 1. Justification: Different colored messages may be a bit confusing or eye-straining for the teacher, so this alternative may work better
 - d. Distinguish read and unread questions for the teacher
 - i. Blue dot next to message = unread question
 - ii. Empty dot = read question
2. As a teacher, I want the ability to share interactive presentations with my students, so that I can keep them engaged with the presentation.
 - a. Students can answers questions in the presentations
 - i. Students can click or tap buttons that are answers.
 - ii. Answers can be collected and given to teachers to monitor progress
 - b. Smoother transitions when sharing different content
 - i. No need to unshare, then share screen again
 - ii. Could have button that allows for teachers to show which tab to show
 - c. **Allow both teachers and students access to a virtual whiteboard**
 - i. **Teachers can write questions, do problems, explain concepts, etc., using the white board**
 - ii. **Students can do their work on a whiteboard**
 - iii. **Teachers can view these whiteboards, view students’ work and progress**

3. As a teacher, I want to be able to view all students screens' (video or image) during a breakout session, so that I can see which groups/individuals are engaged and on task.
 - a. Have one grid that displays all of the students, with each row representing each breakout room
 - b. Have rooms be split into smaller boxes, each highlighted in a color and given a name for breakout rooms**
 - i. These room boxes will resemble a group of desks, as seen in face-to-face elementary schools.**
4. As an elementary-aged student, I want to be able to easily learn and use Zoom's meeting features, so that I can communicate with my teacher and peers without my parents' help.
 - a. Remove unnecessary buttons (i.e. record, invite, etc.)
 - i. Students will never require these functions and some words may not be intuitive
 - b. Use colors with the icons for each button**
 - i. Add more signifiers that will help students associate icons and functions with colors**
 - c. Keep the navigation bar at the bottom fixed
 - d. Better signifiers when hovering a button
 - i. Chat Button - from "Chat(Alt+H)" to "Click on me to open the Chat!"
5. As an elementary-aged student, I want to interact with Zoom through mouse inputs, so that I am not forced to use the keyboard if I cannot type.
 - a. Better "raising hand" visibility to signify student has question by putting it on the navigation bar
 - b. Speech-to-text button**
 - c. Audio recordings that automatically mutes the user upon usage
 - d. Clickable word suggestions
6. As an elementary-aged student, I want the ability to easily identify myself and others in the Zoom meeting, so that I am less confused when in class.
 - a. Pick an image/icon to appear next to my name
 - i. Can be something like a racing car, or dinosaur
 - b. Pick a nickname that is displayed in between my first and last name in quotation marks (ie. Nikola "Nikki" Dimitrov)
 - c. Pick a specific font/color for their name

Wireframes:

Everyone

1a: <https://xd.adobe.com/view/969c0b4a-3253-4f6b-a87b-57c11e03244d-c3cf/>

Justification: There is no way to distinguish different types of messages in Zoom, so by highlighting the messages, teachers will be able to identify and prioritize different chat messages

1b:

Justification: This allows quick identification of a message at a glance. Teachers can quickly answer questions and students can more easily find the answer. Since only text color is changed, the current user interface is kept more intact and minimal clutter is added.

1c: <https://xd.adobe.com/view/7bbbbeeb-2151-4955-94cb-a70b0dc4ae89-2ee8/>

Justification: Having buttons to differentiate the various types of messages allows for the chat to be less crowded with plain back and forth messages and allows the students and teachers to easily identify and respond to questions within the chat. Having these buttons possibly color coded too will help further reduce strain on readers trying to quickly search for and respond to questions and answers.

1d:

Justification: This design allows the teacher to keep track of the questions that were read, so that the teacher can know which questions have yet to be answered. Teachers can click on the question to toggle it as read. The dots are noticeable to easily differentiate questions from other message types but not big enough to be a distraction.

Nikola - 1a and 2(nikoladimitrovbg@gmail.com)

2a: <https://xd.adobe.com/view/e55e4e63-631a-4f7c-ae34-220b7e366187-b00d/>

Justification: By having students pick out an answer in a presentation that requires them to click or tap buttons on the presentations, it provides a more interactive experience for students when compared to simply answering using the chat function.

2b:

Justification: Transitioning between different tabs can be challenging for many teachers. Additionally, teachers often have to stop sharing, and then re-enable screen sharing in order to show information to the students. By making the experience smoother and easier, teachers can have a better time with sharing their screens.

2c:

Justification: A virtual whiteboard would allow for both students and teachers to have a more interactive experience with distance learning.

Paul - 1b and 3 (pga776@gmail.com)

<https://xd.adobe.com/view/e21f4701-3fa1-4785-ba74-8285509749b5-b74c/>

3a:

Justification: A simple grid display format that is instantly legible to teachers. Sticking to rows keeps the display relatively clean regardless of the group size. Portraits can shrink to fit per row, avoiding the need for unnecessary scrolling. Navigation is very straightforward and the next group is always one line below the other.

3b:

Justification: Can better convey spatial continuity of a class room, with desks grouped together. The varying group arrangements and color will help teachers quickly identify and recall which students are in in which group. The layout will be less uniform and depend on the number and size of groups. Students will be organized to fit horizontally so only vertical scrolling is necessary.

Rachel - 1c and 4

4a:

Justification: Removing the amount of buttons on the student's view of the meeting could help improve their learning time for the platform as well as keep them less distracted by all the extra options that they may never need. Also by reducing the amount of buttons available for students there is the opportunity to provide better signifiers such as bigger icons for buttons or more detailed text descriptions of the buttons so that the younger students can better understand the button functionality on their own. We also decided to relocate the Leave button to the upper-right corner to discourage students from clicking on it.

4b:

Justification: Adding colors to the buttons will greatly help the students in learning to use the platform as well as for teachers who may need to ask students to click on a certain function. Students from a young age are taught colors and if a young student doesn't have fully developed literacy associating a function/button with a color will allow them to still be able to use the platform.

4c:

Justification: For younger students keeping the navigation bar fixed at the bottom of the screen can help them find functions when the teacher asks them to do something. This

has the possibility of reducing their response time and saving the young students from the confusion of trying to find their functions after a longer period of inactivity. Also by having the navigation bar fixed at the bottom of the screen the students have the opportunity to become familiar with the locations and colors of certain functions since it will always be present on their screen.

4d:

Justification: Having better descriptions of functions and what their affordances are for younger students will help them choose the correct buttons to use in less time. The keyboard shortcuts for functions that are currently present in the “hover dialogue” are not helpful to younger users who may not have the knowledge of keyboard shortcuts or the technological literacy to understand what Ctrl + H means. Instead simplifying the language and making their signifiers clearer for a younger audience will improve these users' understanding and engagement within the classroom.

Annie - 1d and 5

5a:

Justification: Raising a hand is a common gesture used in a classroom. The raise hand feature already exists on Zoom, but its location and its visibility is poor and inconvenient. Therefore, by relocation this feature to the navigation bar, students can access this feature with less steps. The hand icon is also shown at the upper right corner of the student's video feed so that the teacher can see who are raising their hands.

5b:

Justification: Students will not need to use the keyboard. They will simply click the corresponding button, speak into their microphone, and then click the “done” button once they finish or “redo” if they want to try again. Meanwhile, artificial intelligence will interpret the speech and display the words in real-time. During this process, their microphone will be muted for others so that they won't disrupt the classroom.

5c:

Justification: Students will not need to use the keyboard. They will simply click the corresponding button, speak into their microphone, and click the “done” button once they finish or “redo” if they want to try again. During this process, their microphone will be muted for others so that they won't disrupt the classroom. The student will not be able to replay their recording before sending the recording to reduce the time spent on creating the audio recording.

5d:

Justification: Word suggestions can predict the current word that the student is trying to type and the next word based on the current word. This can greatly reduce the amount of typing in the chat. Suggestions are displayed above the text box so that the user can see them with minimal movement of their eyes.

Will - 6 (whmcdaniel@gmail.com)

6a:

Justification: As the saying goes, images can speak a thousand words. Allowing students to choose an icon that they like or resemble themselves can not only display their interests and/or personality, but they can also be used for others to associate images with their classmates. The icons are pre-approved to ensure appropriateness.

6b:

Justification: For students who have nicknames or alternative names they go by, other students and teachers can easily identify them. The nickname is placed in between their real name to signify they have a nickname, but also allows the teacher to still know what the student's real name is.

6c:

Justification: There are many font styles and colors that students can choose from, resulting in unique combinations of identification. The types of font that can be used will be limited to fonts that are still legible. The same goes for the color that they can choose.

C. Detailed Designs

Chosen Designs:

1. Chosen: Design 1a (tone of red can change when question is answered)
 - a. **Justification:** By having the different types of messages be color coded, the teacher will be able to much more quickly identify what types of messages are being sent. Questions will most likely be the highest priority for teachers, so being able to identify them quickly is important, in order for them to answer all questions. Otherwise, teachers may accidentally skip certain questions without realizing it. Additionally, having the color coded bubbles rather than color coded text is better, because teachers will be able to identify where exactly each bubble starts and ends. We chose colors that are easily distinguishable to colorblind people.
2. Chosen: Design 2c - Virtual Whiteboard
 - a. **Justification:** The whiteboard feature is the most versatile out of the three designs. It can be used in a variety of classroom situations. Teachers can ask students questions, have them write their answers on the whiteboard, and then show it to the teacher, just as in traditional face-to-face settings. The whiteboards can be used in group settings as well, with students brainstorming ideas on their whiteboard. Lastly, the students can use their whiteboards for playing games or drawing, when appropriate. Students can see two, identically-sized whiteboards: the teacher's on the left and theirs on the right. This allows the student to see both whiteboards clearly. Teachers can see everyone's whiteboards: theirs on the left, and the students' on the right; the sizes of the students' whiteboards are smaller than the teacher's to allow the teacher to view everyone's whiteboard.
3. Chosen: Design 3b
 - a. **Justification:** This design more closely resembles a real classroom environment visually/spatially and provides better group differentiation than the grid design. The teacher does not need to understand the labels for the rows and the columns to figure out which student is in which group. Additionally, the teacher can monitor all groups with easy access to the individual students if necessary. Each student's video feed is outlined in a color specific to each breakout group to allow the teacher to quickly identify and better remember groups. Padding can be adjusted dynamically to avoid too much empty space and fit more students on screen at once. With only rows, a particularly large or small group would leave a lot of empty space. Furthermore, some research has shown that having varying

colors and shapes for an object can improve short term memory recall (Xu, Y.). This will be essential for teachers with many students and classes.

4. Chosen: Design 4a, 4b, and 4c (based on the 4-color coded file)

- a. **Justification:** All of these design alternatives would be great changes to Zoom to make it more kid-friendly. Firstly, by color-coding the various buttons present, students will be able identify the different buttons much more easily. By removing buttons for unneeded functions, students will need to learn less functionalities. For those with limited reading abilities, it is better to communicate visually via colors than text. Lastly, by having the Navigation Bar be fixed at the bottom, students will always be able to view and have quick and easy access to it. This way, students will no longer be confused as to where their navigation bar disappeared to and how to bring it back up. We chose to use a color palette called Tol, which was developed with the intention of being accessible to colorblind people (Nichols). We also changed Participants to Classmates because students are more likely to be familiar with the latter terminology.

5. Chosen: Design - 5b with elements of 5a

- a. **Justification:** Younger students will have varying levels of literacy, so having them type out a question using a keyboard may be difficult and time-consuming. They are also prone to misspelling words, which may decrease the performance of design 5c. Moreover, voice recordings impose too much responsibility on the student to ask a question accurately. Therefore, a keyboard-free alternative is the better option. While voice recordings may be easy to use, its biggest downside is the lack of closed captioning. To understand the message, the teacher must play and listen to the audio recording, which takes more time than reading text. Therefore, we chose the speech-to-text design because it will be easy for students to ask questions, answer questions, or make comments, and it will be the fastest design for student-to-teacher communication via chat. We added a red exit button to allow the user to cancel the speech-to-text. It is located at the upper right corner just like the Leave button to symbolize similar functions, which is to close or exit.

6. Chosen: Design 6a

- a. **Justification:** Allowing students to add a simple character next to their name is the easiest and least distracting way to show distinction between students. If we let students change their nickname, font type, and color, it might serve as more of a distraction to the teacher when they are trying to identify different students. A simple icon gives the student just enough of an ability to distinguish themselves from their peers, but not so much that they could distract and confuse the teacher. Choosing this design also prevents students from getting too wrapped up in

customizing their profile and keeps them engaged with the learning material instead. This design is kept very simple to maintain ease of use. Next to the student's image there is a black dropdown menu that can be clicked and one of the default images can be picked by the student.

Rules for consistency:

1. Black text
2. Use dull colors - nothing too bright. Less eye-strain
3. Use Rachel's default view of Zoom - with the color coded buttons
 - Add icons in/next to buttons to better signify
4. Use the "Tol" color palette

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