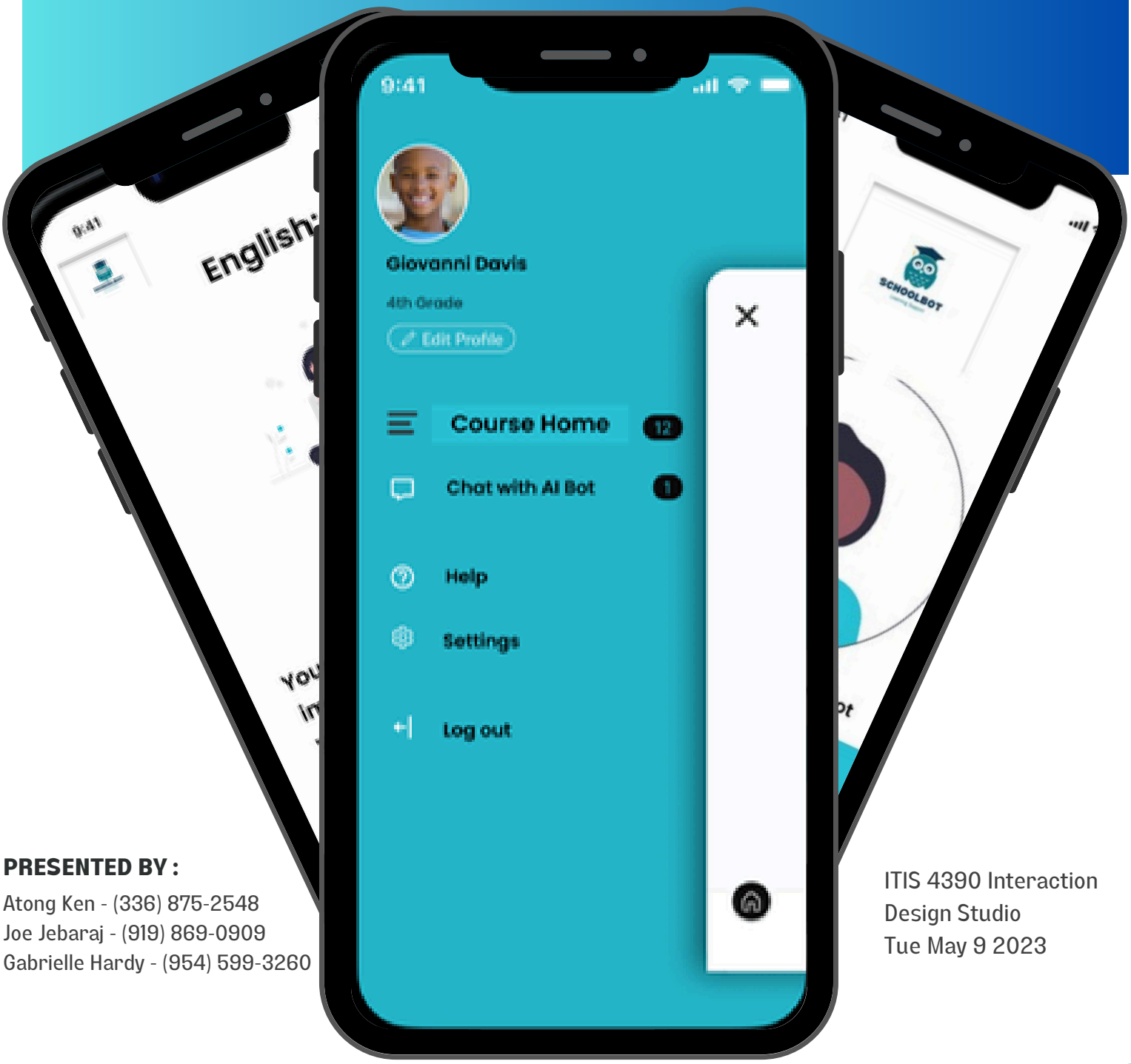
SchoolBot Mobile App Development

# PRODUCT DESIGN

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# PROJECT ABSTRACT

Abstract- This paper describes the Design Goals, Persona and Stories, Prototype, Evaluation, Ethical Issues Reflection for this project. The purpose of this report is to detail the development of the SchoolBot AI application. The report details the important elements of this project's development.


# DESIGN GOALS

Throughout this semester, the focal point of our project has always been in regard to the design goals implemented at the beginning. We have broken up our design goals into four separate sections: the focus group study, the design challenge, the tasks users can perform in our interaction design, and the usability issues that must be addressed. All of these components holistically make up and are pertinent to the success of our design goals. Throughout this report, the emphasis on design goals will be an essential theme that can be demonstrated. The design goals have been a critical factor when deciding the direction of our application in general and the components of our prototype.

# DESIGN CHALLENGE

The first portion, and possibly the most critical, was tackling the design challenge. In order to create the best possible application, we focused on the UNICEF's seventeen sustainable development goals. The primary goal that our project wanted to accomplish was the goal of quality education. It would make sense to think, especially when living in the West, that quality education is easily accessible to most children but this is far from the case. Though the access to quality education continues to be on the rise globally, there still remains a significant amount of work to be done within that domain. That is where our application steps in and attempts to bridge the accessibly gap that is so prevalent within education. We want to make our application completely free while also providing a similar quality of education to some of the top private schools in the world. In order to accomplish this our app utilizes advanced Artificial Intelligence equipped with Natural Language Processing abilities.

This will allow children of all ages (4-19) to be able to use our application smoothly despite from being from a variety of backgrounds and geographic locations. Since the AI essentially replicates the entire structure of a school and its necessary systems, it allows us to reach students at a very cost-effective number compared to traditional schooling methods. The other design goals that we focused on were gender equality and reduced inequalities. Gender equality is particularly significant when discussing education, because throughout different parts of the world girls often receive the blunt end of educational opportunities. Often in more traditional cultures, the resources for academics and schooling is reserved for boys over girls, but our app mitigates that issue by allowing entire households to attend school cost-free, regardless of their gender. Our application also adjusts to the needs and desires of our user base, which means that in countries where girls are only used to learning under male-centric curriculums, they will finally receive an opportunity to receive an education which caters to their specific needs.

# DESIGN CHALLENGE

Another way our application approaches the sustainable development of gender equality is by reducing bias. Since our application is headed by a AI teacher instead of a human teacher, it essentially eliminates all risk regarding pre-determined bias in the classroom, which is an issue that disproportionately affects girls. The mobility of our application can also allow those girls who are forbidden from attending school to perhaps learn in secret and eventually acquire the necessary degree to escape their situation. Women who have access to education also give back to their community at a higher rate than their male counterparts, making it a sort of win-win situation for both the girls and the communities in which they reside.

The final sustainable design goal our application focuses on is reduced inequalities in general. Since our application is mobile and operates 24/7, we are able to provide an access to education to those with unique geographic challenges and hours of availability. For example, a child in an impoverished country who must work for sustenance for their family during the day, would be able to attend school during the evening on their own time to achieve academic success. Another example of how our application helps address the global problem of inequality is regarding individuals such as refugees. These people often have to continue to move in order to survive, which often leads to a lack of access to education. We can help address this issue as our application is mobile and does not require any set geographic location to operate as with a traditional brick and mortar school. It also helps address the issue of inequality even within developed countries because it can act as supplement to regular or traditional schooling. This personalized tutoring can be the difference between getting a top academic scholarship and not even getting into the student's backup university. Overall, we hope that implementing these design goals into our application will make a massive and impactful difference in the lives of these students.

# USER TASKS

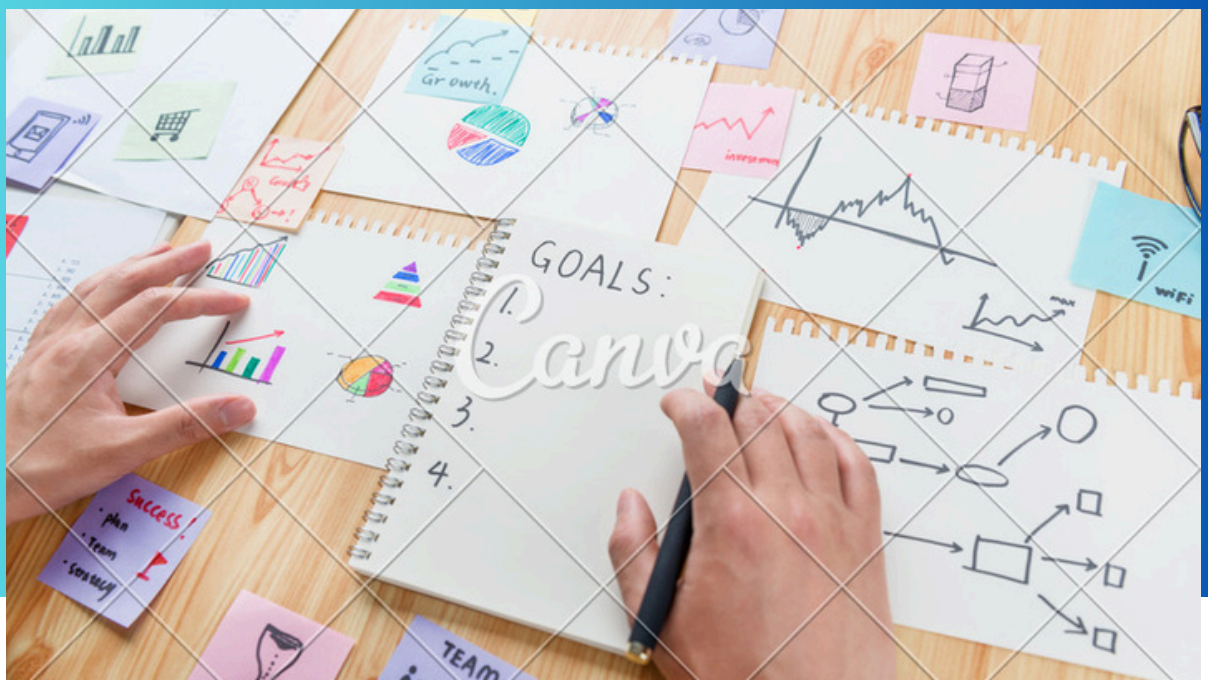
In our interaction design, we have allowed our users to get a glimpse of the numerous features accessible from within our application. The primary feature that we have implemented into our prototype is the Chat with AI chat-box. This chat-box is a core component of our application because it mimics the role of a principal or administrator within a traditional school setting. Any non-course specific needs sought out by the student would be handled by this AI, including handing out disciplinary action, altering grade placement, and addressing issues outside of the classroom. In our prototype, our users can interact with this chat-box and see it addressing these problems in real time. The user can also work though the signup process in our application, including taking the extremely critical entrance exam provided to students in the early stages of signing up. Before the entrance the exam the user must consent to the terms and conditions regarding privacy and data storage. After the user has accepted the terms and conditions, they will be permitted to take the entrance exam. After finishing up the entrance exam, the users of our prototype can look through and work on the five predetermined courses: Science, Geography, History, Math, and English.

The users will then be able to work through problems with the assistance of the AI for each subsequent course or subject. This will allow the user to get a strong grasp on how the AI will help them solve problems and learn about different subjects. Each course comes with its own course specific AI that will assist each user with their specific issues or concerns within each course. Once the user has registered themselves, they will be allowed to login from the home page and explore the prototype through that path. The user can also get a general feel regarding the design of the application as well as the different paths the user can take to access different components of the app. Finally, our prototype also has a hamburger menu which can be accessed through the three lines on the right side of our interaction design. Within this hamburger menu users have access to: the course home, the AI chat-box feature, the help page, settings, and the ability to log out.

# DESIGN INSIGHTS

The final component of our design goals for our application is the discussion of the insights from the focus group that we conducted 1/3 of the way through the semester. The focus group primarily utilized a group of six students from ages 14-17. We asked the users for a list of ten somewhat open-ended questions in order to get a feel for what we needed to implement specifically within our application. W effect that the overall feedback was positive and helped direct us in the correct direction, especially in the preliminary brainstorming process. One common theme that we continued to home in from our focus group was the different individual needs of different students. The focus group reaffirmed our belief that having a custom AI that can build a personalized academic setting for each child would be a significant advantage within the world of education. The students wanted the AI to be detailed when it assists the user, which we have implanted in our interaction design. Another common theme from the focus group was the desire for interactivity from the students.

Our focus group users believed that school would be significantly more engaging if the teachers operated the class in a more interactive manner. Utilizing this feedback, we have strived to ensure that our users have numerous options to interact with the curriculum in a positive and engaging manner. The last common theme we recognized in the focus group feedback was the importance of permitting breaks in school and instruction. A lot of the students felt as if they did not have enough "brain breaks" within school hours and requested that we add the feature into our application. We have done this by allowing the AI to assist each user to their specific needs and on their own timeline. The focus group helped us address significant issues that we would have otherwise not considered.




# DESIGN GOALS

Overall, tackling the design goals was a critical factor throughout the development of our application. We used the focus to group to help give us a baseline on the items that would need to be addressed within our SchoolBot AI. The design challenges of quality education, gender equality, and reduced inequalities helped push in the appropriate direction and gave us guidance on what issues our application would help address. The prototype will help our future users get a solid feel for the overall layout and usability for our final product. Implementing and considering the design goals throughout every step of the process has been a crucial component in the success of our application.


# PERSONAS & STORIES

Personas assist designers in visualizing the complete target audience that will be using the app. Building empathy and context, also getting to deeply understand this persona that mimics the target user. By illustrating personas, we can closely establish their needs for our product. Our personas are k-12 students in which our app targets. These children come from unconventional and non-tradition backgrounds. Providing an education platform that assist students who face poverty or other challenges, obtains the sustainability development goal of equal education.

# PERSONA 1

One of our design goals is accessibility. We want our app to be accessible to a wide range of users internationally. Giovanni is a young boy whose parents also have to support his siblings. His family can not afford to get the most tech savvy computer, but the passed-down I-Pad the family has from the uncle, works just fine. Not all familles have the ability to afford tutoring services especially for multiple children in a family like Giovanni's. With the SchoolBot app, Giovanni is able to be the motivated, smart kid he is and succeed with our app in his touring journey,


***Figure 1a.***
***User Persona***

# PERSONA 2

Our design goals are to target non-traditional students and provide them with a personalized curriculum that suits their busy needs and provide them with a GED equivalent. Nina is in her last years of high school and works many hours to provide for her family with her single mother. She is unable to attend regular school and can not afford it. However, she plans to pursue upper-level education, so a GED IS needed. Our app provides her the flexibility needs she needs as it is a self-paced curriculum. Helping Nina overall achieve her goal in receiving scholarships and to possibility study-abroad with a GED equivalent.


***Figure 1b.***
***User Persona***

# STORYBOARD 1

Storyboards help visualize and illustrate the design purpose. It helps designers envision and prioritize the weaknesses and strengths within the design to further achieve the best model for users. The storyboards we've chosen are based specifically on the target audience and user. While creating it, we have thought about our user's needs and situations they might face. Our app will be used by those who do not have proper access to education, they have more needs than the typical student. Within our storyboards, we based them on our user personas who are both from impoverished background

Nina wants to improve on the subjects, reading and math to test for a GED since she does not have access to attend a regular high school education. Our app design goal is to provide accessible education. To achieve that, we have provided the educational content through text and small-file input. Provided will be text-based resources like articles and study guides and as small files such as videos, audio recordings, or interactive simulations. Nina will be able to scroll and navigate the curriculum so it will also be easy to use. Since the information is provided through small-file input, it will be engaging to Nina as the information is not too overwhelming.

The AI will determine her strengths and weaknesses and use it to design a curriculum that will increase her understanding and comprehension, targeting our design goal efficiency. Nina is able to complete the modules within the curriculum with the assistance and guidance of AI. If she has a question or answer, the AI will answer with detailed answers or tips that will educate her based on her learning style. Nina is also able to track her progress within core subjects while studying for the SAT and the AI will then adapt to Nina's progress based on new needs.

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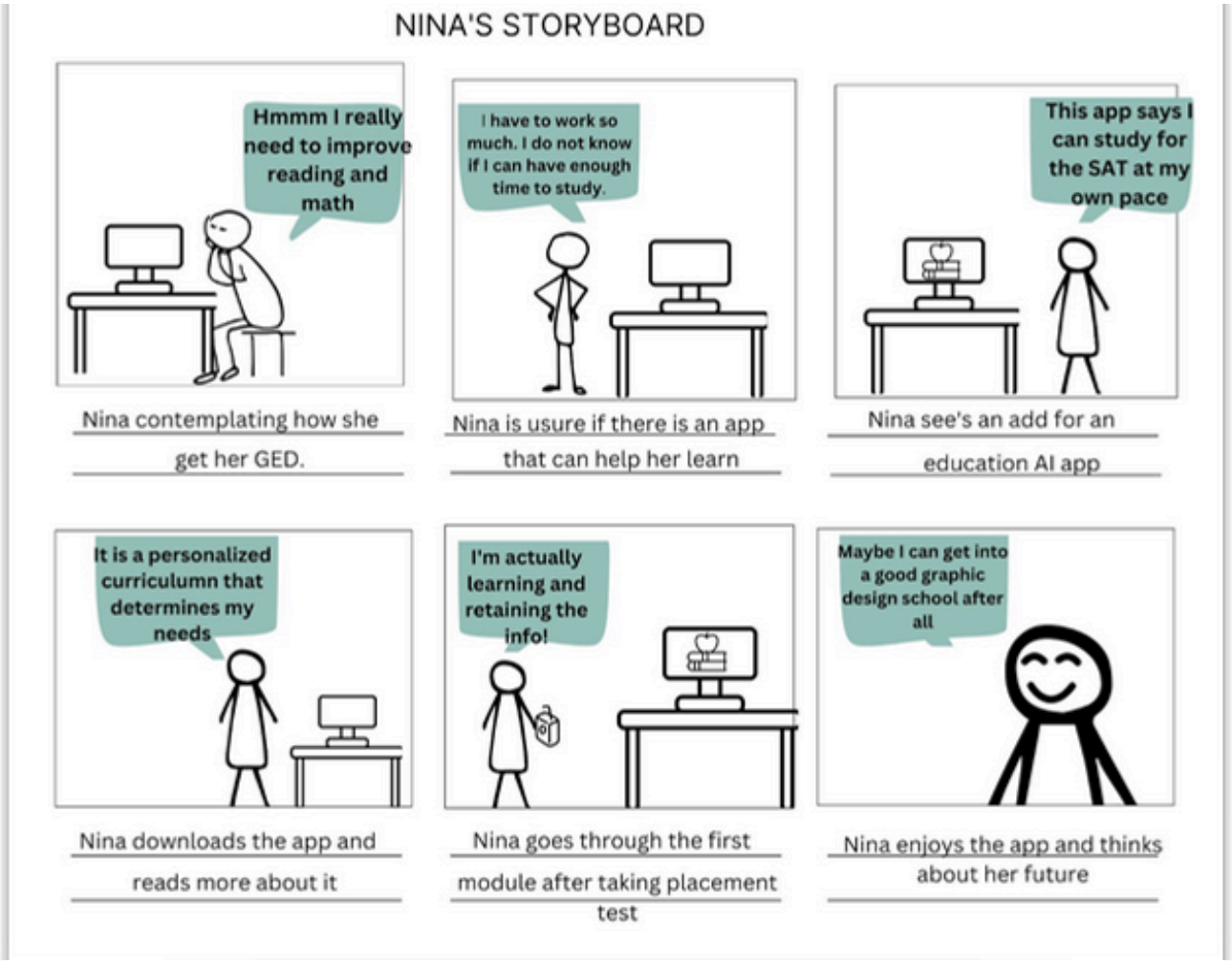



***Figure 2a.***
***Storyboard One***

# STORYBOARD 2

Giovanni, the first storyboard portrays his story as his mom introduced them to our app, school bot. They are introduced through an old IPad given from a family member overseas and he will share that with his siblings. This is significant since one of our design goals in usability is to provide accessible education. The app is cloud-based, meaning Giovanni and his siblings should be able to access the app anywhere as long as they are internet connected. This app will be supported on older platforms since we are targeting students who may not be able to afford the newest technology. When creating an app that targets those in impoverished areas, it's important to level the education field and ensure all users can use the platform. The AI then creates a custom syllabi for Giovanni and his siblings so they will be able to take courses similar to standard education.

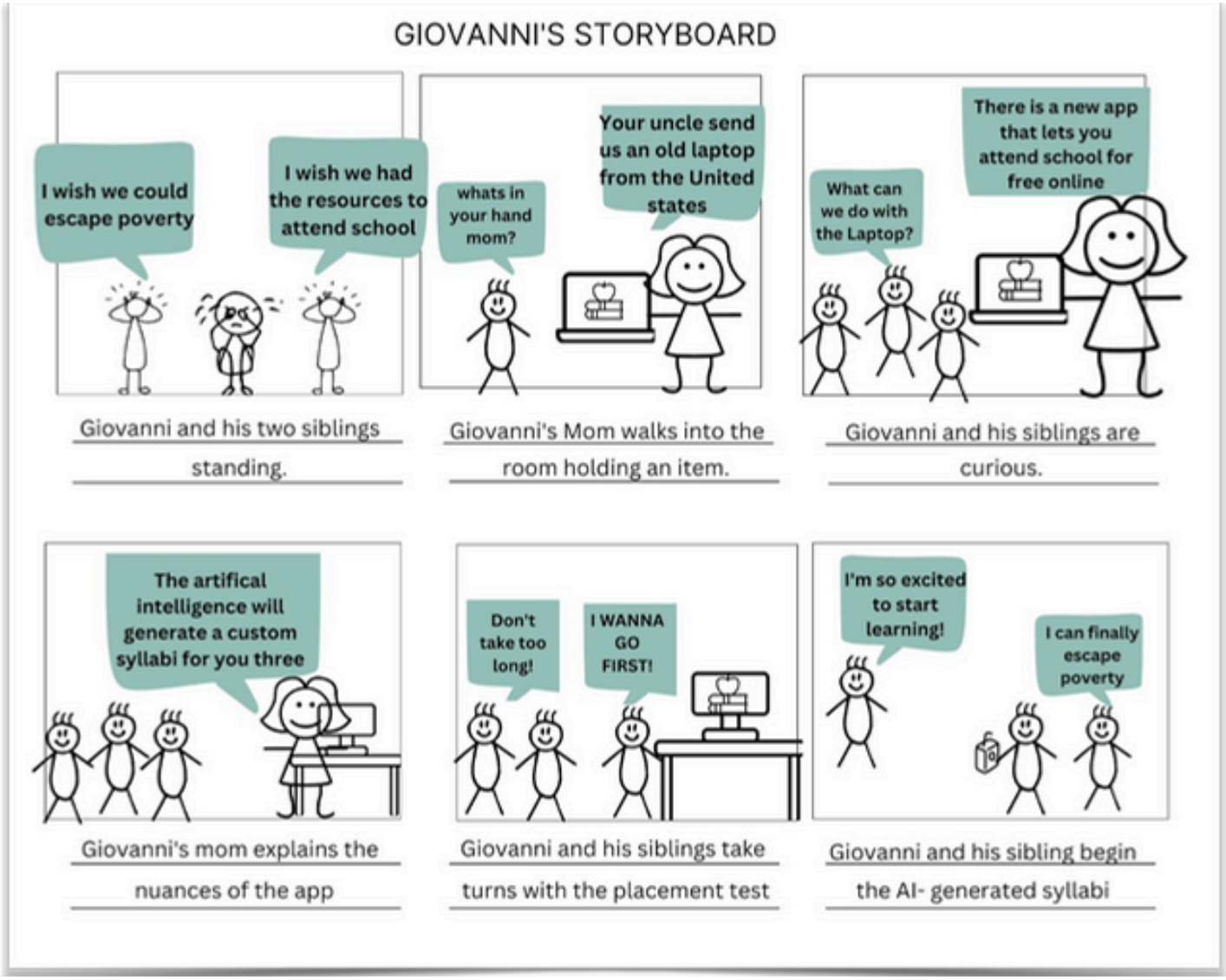



***Figure 2b.***
***Storyboard Two***

# USER JOURNEY 1

This first user journey is guiding how a high school student is searching for an app to self-study for SAT improvement. The app attracts the user for SAT improvement due to our design goals of user engagement and efficiency. The co-creative AI checks to see if the student is still engaged in learning to help them stay focused by providing generative feedback. If they are not focused then the AI will implement different methods to help them stay on track. The feedback is helpful in helping students stay engaged and not off-track when they can not learn or are stuck within a problem. After a week, the user has improved SAT scores in reading and math by a few hundred points after only using the personalized AI curriculum, proving the AI's design in efficiency. Overall, the first user journey illustrates a user in self-studying for the SAT in our app that assists them by using a placement test that is efficient while helping them stay engaged.

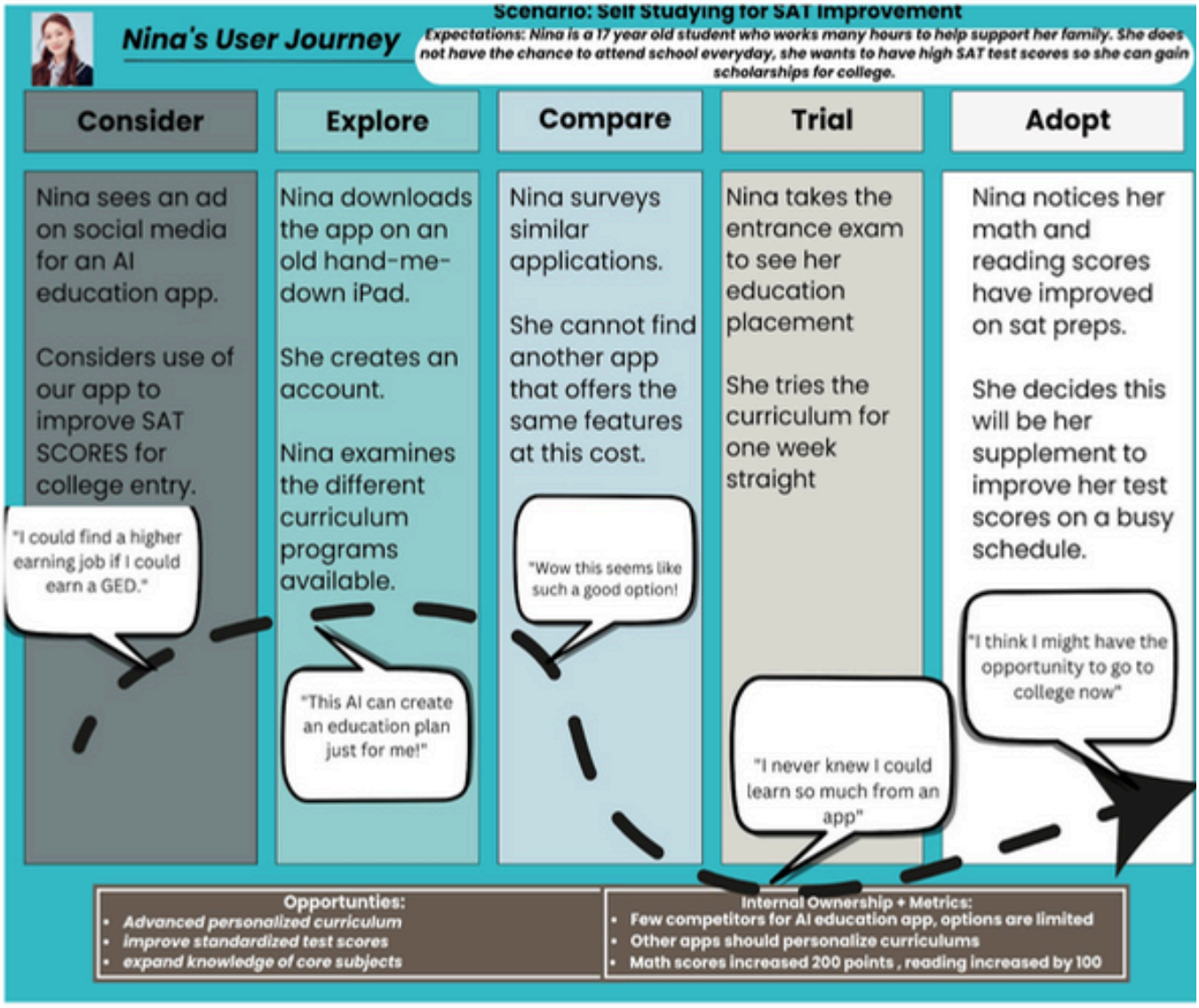



***Figure 3a.***
***User Journey One***

# USER JOURNEY 2

This user journey illustrated Giovanni, an elementary schooler, and his mom choosing our app has a self-tutor app. This app is one of the few tutor-AI apps that offer a personalized curriculum. Giovanni can go through the modules needed to improve on his English/Literature skills.

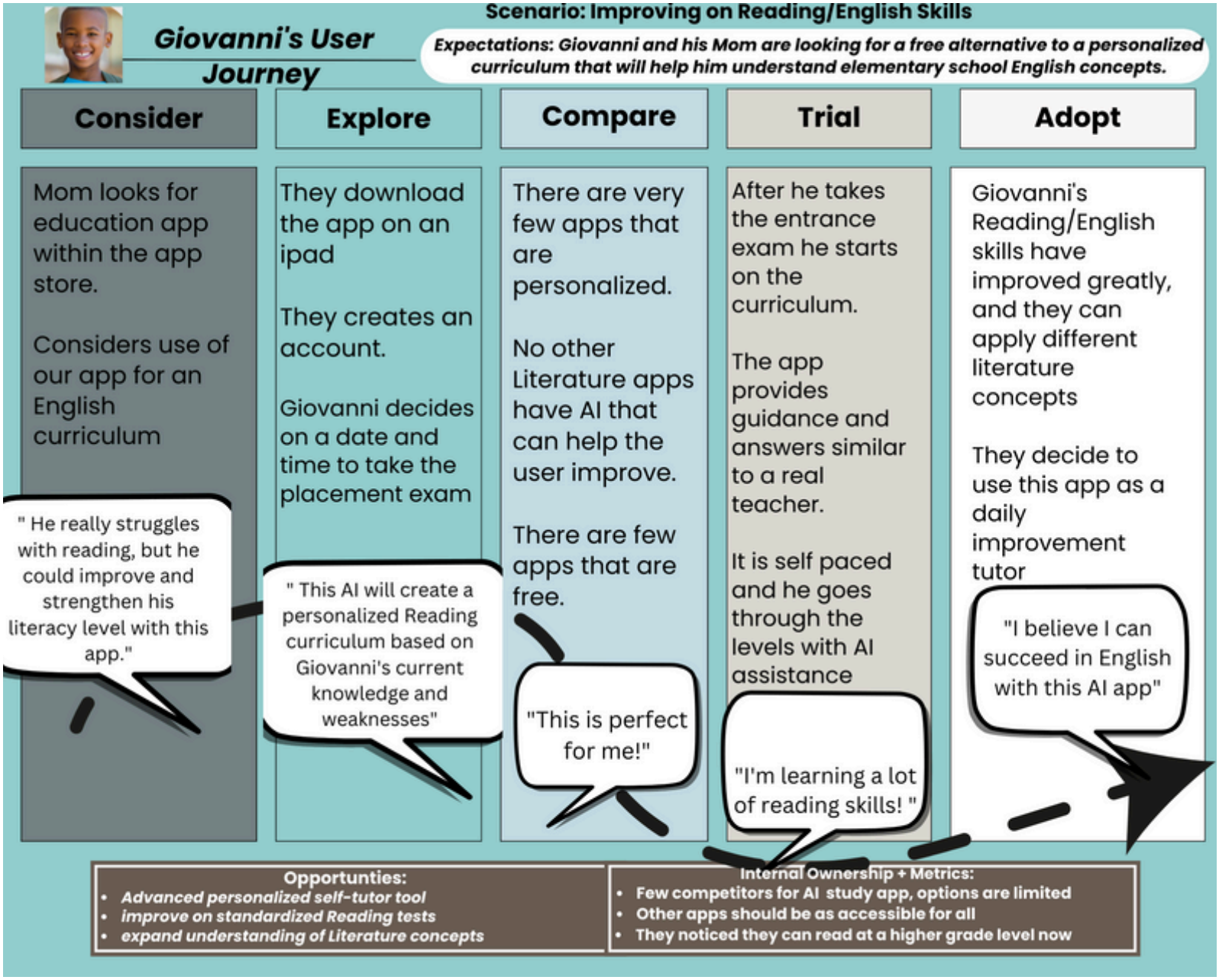
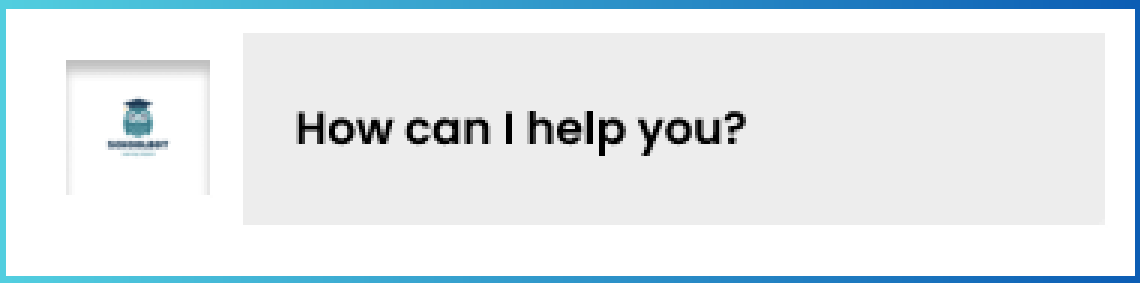



***Figure 3b.***
***User Journey Two***


# PERSONAS & STORIES

Overall, the personas, storyboards, and user-journeys all illustrate providing accessible education to impoverished communities and have been crafted with the target audience and their needs. The first storyboard features Giovanni, who discovers the app through an old IPad and is able to access it through the cloud-based platform anywhere. The AI generates a custom syllabus for him and his siblings, leveling the education field by supporting older platforms. The second storyboard depicts Nina, who wants to improve her reading and math skills to take the GED. The app provides text-based resources and small-file input to make the content engaging and easy to navigate. The AI personalizes the curriculum based on her strengths and weaknesses, and she can track her progress and receive detailed feedback. The user journeys demonstrate the app's efficiency in assisting students in self-studying for the SAT and improving their understanding of math concepts. The AI generates personalized placement tests and curriculums. The AI also provides a generative feedback feature that keeps users engaged. The design goals of accessibility and efficiency, have been successfully achieved within our story boards and personas.




# INTERACTION DESIGN

Our interaction design is intended to ensure a seamless experience for the user, allowing them to easily navigate through the different sections of the application, each utilizing unique methods of input and output to provide an accessible educational opportunity. Taking the COFI Framework into consideration, our team has created an experience that enables users of our target audience, individuals in need of a GED or equivalent, to identify their strengths and weaknesses by creating a curriculum tailored to their needs.

# INTERACTION TYPES

The flow of our application begins with a placement test, which assesses the user's proficiency in different core subjects. Based on the results of the test, the application generates a personalized curriculum for the user, with lessons and exercises designed to improve their skills in the areas where they need the most help. As the user progresses through the curriculum, they receive feedback and are encouraged to practice their skills using additional resources provided by the application and its integrated artificial intelligence.

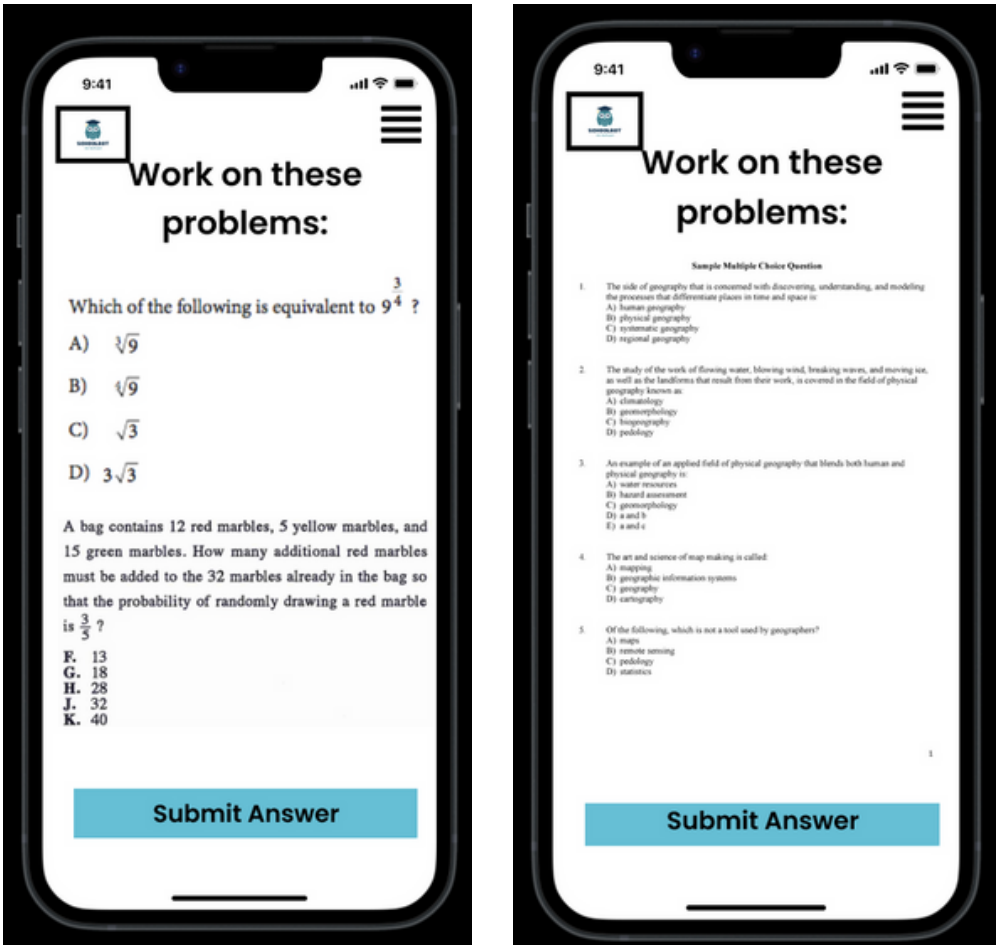



***Figure 4a.***

In this example, a user is presented with text output containing practice questions and contextualized imagery of mathematical representations.

# INTERACTION TYPES

The interaction components necessary for our co-creative AI include input and output text interfaces, decision-making processes including checkboxes and radio buttons, and interacting with AI generated spreadsheets. These input interfaces include the placement test, where the user provides information about their educational background and takes a test to record their skills. Output interfaces include the personalized curriculum, progress reports, feedback on performance, and contextualizing through AI curated or generated images. Decision-making processes involve the AI's ability to analyze the user's data and make decisions about the best approach for the user's learning. Feedback mechanisms include notifications about completed lessons and exercises, progress reports, and encouragement to continue practicing, in addition to any considerations the user may request from the integrated AI, such as extensions of recommended achievement dates.

Within our application, the primary interaction type is input. Users will provide information regarding their educational background and take a placement test to begin. Output is a secondary interaction type, as the application provides personalized curriculum, progress reports, and contextualization to the user. Using this generated output, we are able to provide an experience that may translate to various types of devices and interaction types, leaving open the potential for a seamless experience through a potentially cloud-based application. This allows users to receive a consistent level of design, interaction, performance, and quality regardless of device or form factor.

Keeping the COFI Framework in mind, it is important to recall that signifiers include the visual and auditory cues that communicate to the user how an object should be used. In our application, signifiers include clear and concise instructions on how to take the placement test, in addition to how to navigate through the curriculum, as well as notifications and progress reports that help the user understand their performance.

# ARTIFACTS OF ITERACTION

The artifacts of interaction refer to the physical and digital objects used in the interaction processes between the user and the application we have designed. The artifacts in our application include both tangible and intangible objects that help to process communication, feedback, and control in the user's interactions.

Some of the artifacts present within our application include input interfaces such as our placement test, output interfaces like the personalized curriculum, navigation elements like buttons, menus, and other graphical user interface elements that enable users to navigate through our application while accessing different features and functionalities, and feedback mechanisms including notifications and progress reports.

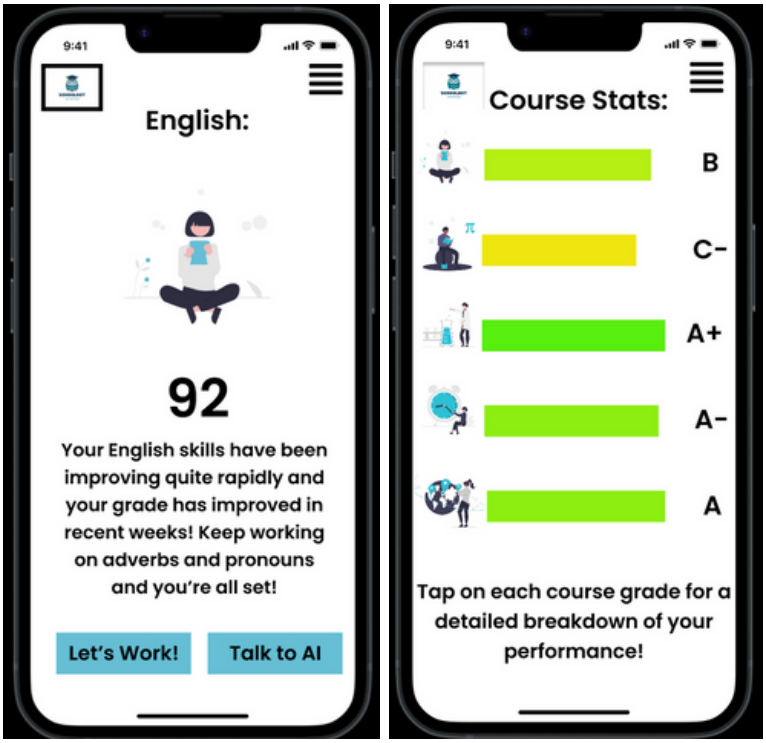
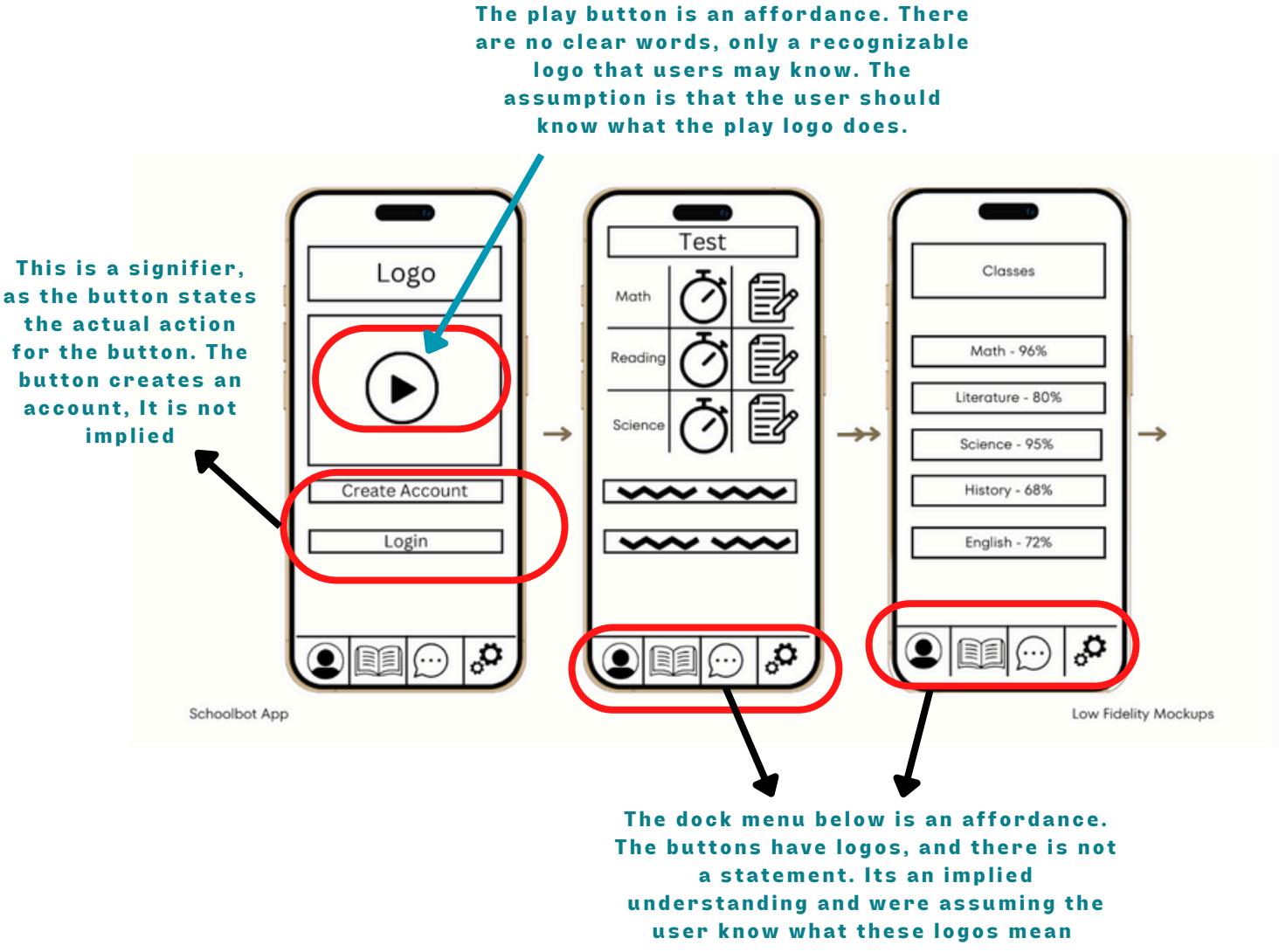



***Figure 4b - 4c.***

Artifacts of interaction include progress tracking and gamification elements, some of which are used and highlighted within our application here.

# AFFORDANCES AND SIGNIFIERS

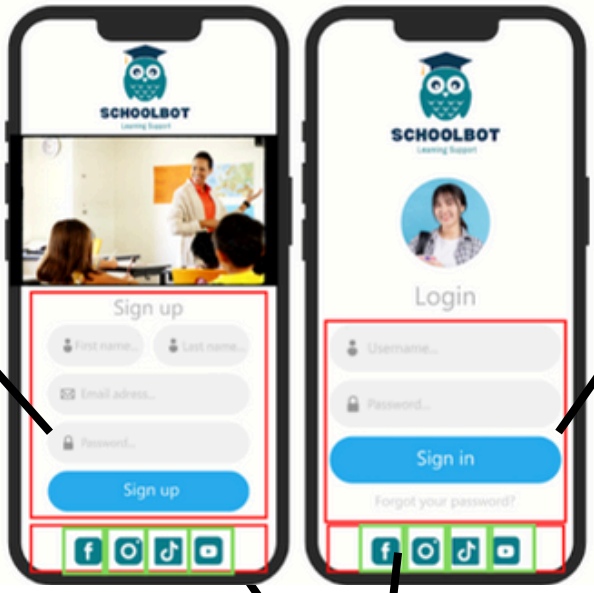
In the figure below, there are many interaction types displayed. Starting with the play button which is it a command interaction type, as it is initiating an action to start playing something. Choosing between a login or create account button would be considered selection or choice interaction. The menu options on the dock would also be considered selection or choice interaction, as the user can choose between different buttons with different outcomes within the menu.



# AFFORDANCES AND SIGNIFIERS

Beginning with the first interaction type on this page would be the sign up and login fields. They are. both considered a form of Command-Line Interface (CLI), in which it involves text-based input. The users typing their information with the appropriate fields would be a text-input interaction.

The fields where the user enters their information are signifiers. All of the fields state exactly what the user needs to enter. For example, password, the user types password. There is also an affordance for lock symbol, that implies it a lock. However, since there is a password beside the lock, it is overall a signifier.



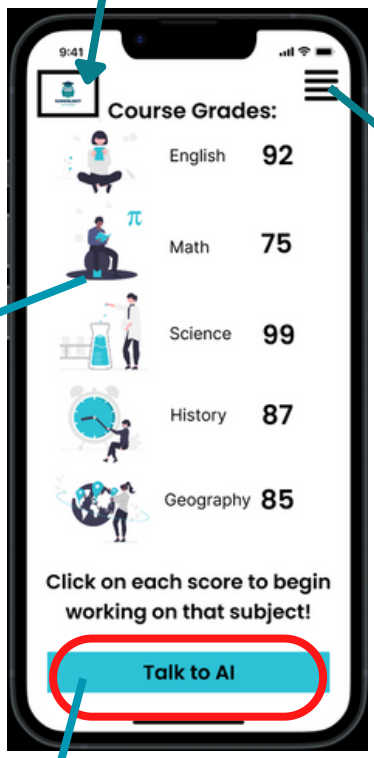

The sign in button is a signifier. It is a straightforward sign for the user to click. The button does exactly what it states, "Sign-in"

The dock menu below is an affordance. The buttons have logos, and there is not a statement. Its an implied understanding and were assuming the user know what these logos mean

# AFFORDANCES AND SIGNIFIERS

To display some of our interaction types, we highlight a answer button signifier. This button is an instructing interaction type as the user may select different answer choice options. This signifier may also be displayed as a question and answer as the AI provides a question in which the user must provide an answer to the question. Another interaction type would be the Menus for the hamburger menu, as there are multiple possible user actions are listed on the screen and the user can select one of them.

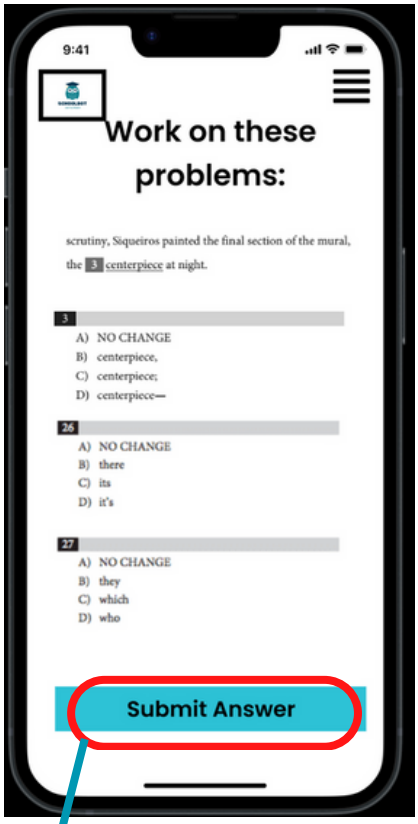
The schoolbot owl is our app logo/trademark. It is an affordance. We've highlighted the outside so users can click on the button to talk to the AI bot. Its an affordance because we are assuming with the owl bot logo and a black border, users know its clickable.




The hamburger menu is an affordance. We are assuming the user knows what to do with this menu, and it is a recognizable logo. It does not tell the user what to do, we are just implying the user knows.

The courses are signifiers. It states exactly what course subject the user wants to work on. The user can either click on the logo or the words and it will take them to the chosen subject. its direct and clear

This is a signifier, as the button states the actual meaning for the button. It is more direct and clearer to users. Clicking talk to AI, actually leads you to talking with the AI in a chatbox.




The submit answer is a signifier. It signals for the user to submit the answer when they are done choosing the correct answer. Its direct for the action the user should take. The top of the page stating work on these problems, to the problems being shown. Its clear for the user to know what the submit answer button does

# COFI FRAMEWORK

The COFI Framework is an essential component of completing a successful application. The collaboration style that our application uses is both parallel and turn taking. Within our application, our AI generates content while the user learns and practices the lessons within. This interaction style is defined as turn taking because interactions are limited to 'sided responses'. This means that once the AI has created a lesson, it will wait for the user's interactions to complete before examining the work done and beginning to generate a new output.

The timing of these responses may be either spontaneous or planned, with some limitations. Specific sections of our application will execute planned outputs from our AI, such as entering the placement exam, while spontaneous responses may be generated at the request or as a result of direct user interaction. For example, some spontaneous interactions may take place when the user requests help or consideration from the AI. The communication style for Human to AI Intentional Communication is via text but can also implement voice to text technology. The communication style for AI to Human Intentional Communication is via text but can also implement text to voice technology. The contribution type for both parties is create new content for the other to interact with.

The COFI Framework was critical in the development of our application as it serves to guide computing professionals on creating successful and productive designs and applications for their work. In the case of our education app, the COFI Framework assisted to highlight examples to strive for to create relatable, understandable, and accessible educational experiences with the help of co-creative AI.


# PROTOTYPE DESIGN

Schoolbot App was designed to be user-friendly in providing ease of use, efficiency, and engaging capabilities to keep the student user focused on an enjoyable learning experience. Prototyping is a crucial step in the process of designing a website so we designed a low-fidelity prototype and a high-fidelity prototype. In the low-fidelity prototype, we utilized wireframes to showcase our users' journeys while the high-fidelity prototype contained a higher level of detail in visual design and information. Within our prototypes, we were able to analyze user performance levels or the users' general behavior and reactions to our overall design. Which we made minor appropriate refinements and alterations in the right direction to maintain integrity, engagement, and modern design flow.

# WIREFRAME

During the first iteration of the SchoolBot design, we sketched an initial wireframe to bring our vision to life. We focused on our target demographics and started the sketch on the sign-up page/profile account creation, the second entrance exam, and the exam score results page. At the beginning of our journey, we used these three screens as the basis to formulate our user journeys. In the wireframing phase we were able to evaluate the structure of individual pages/screens; develop an understanding of how screens/pages work together (from our user perspective), and prepare a guideline for the next phase of the design iteration.

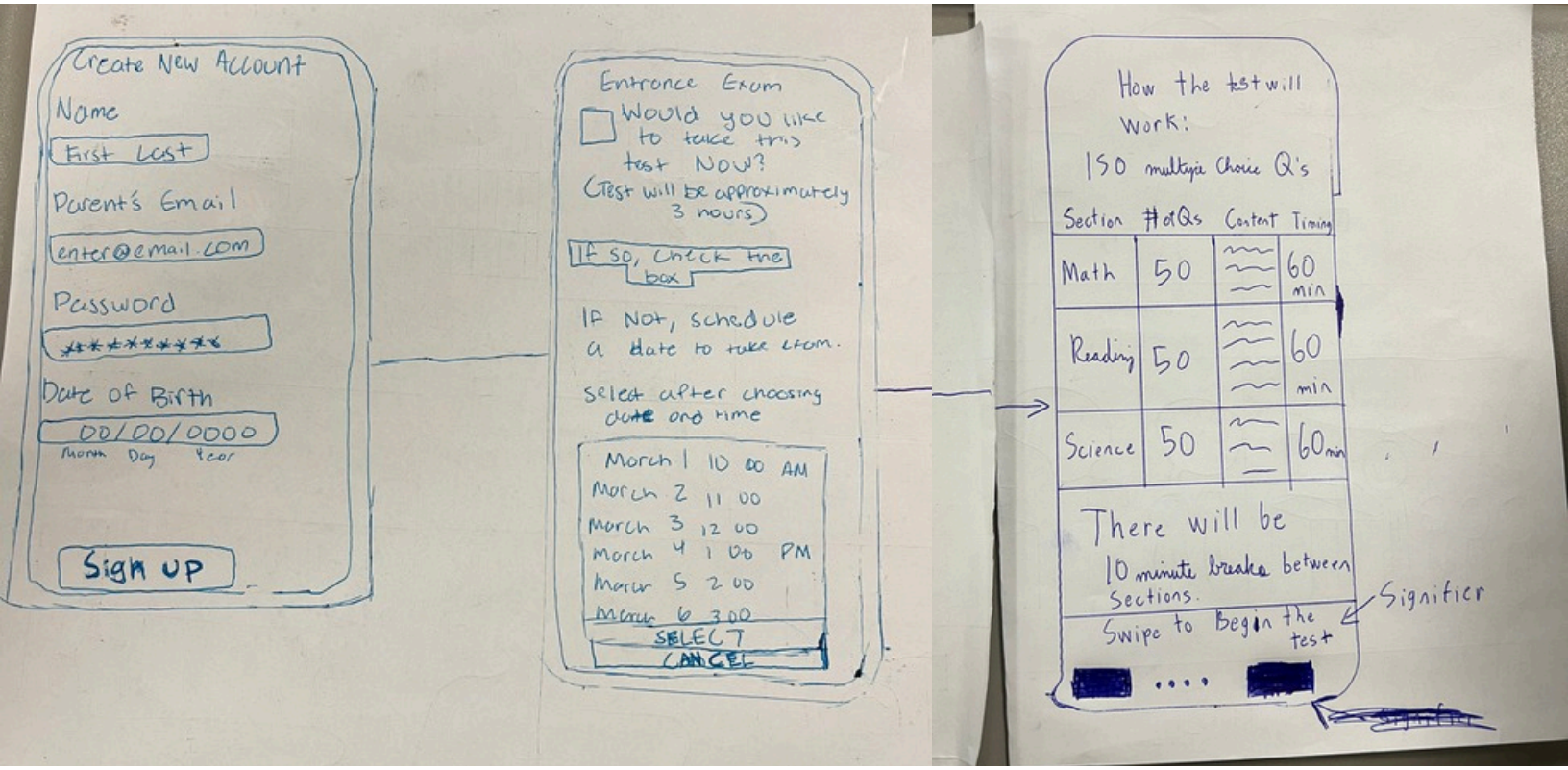



***Figure 6a.***

***Wireframe Sketch/Screens***

# LOW FIDELITY 1

As we continued to develop the design of SchoolBot we used the online software tool Canva to develop a refined visual representation of our app. We continued with a low-fidelity concept and used icons and text to distinguish a more accurate structure and design layout. We stayed away from colors and focused on the layout in more detail to guide us in how a user would interact with the mobile application.

1. The user would start on the profile set-up page and create an account (new user)
2. The user will then start with an entrance exam and get to choose which subject to start testing first.
3. The user will then get the results from each subject on a weighted percentage scale
4. Towards the bottom of the screen, we have our menu showcasing (user account icon, resources icon=book, chat icon, and tools/settings icon)

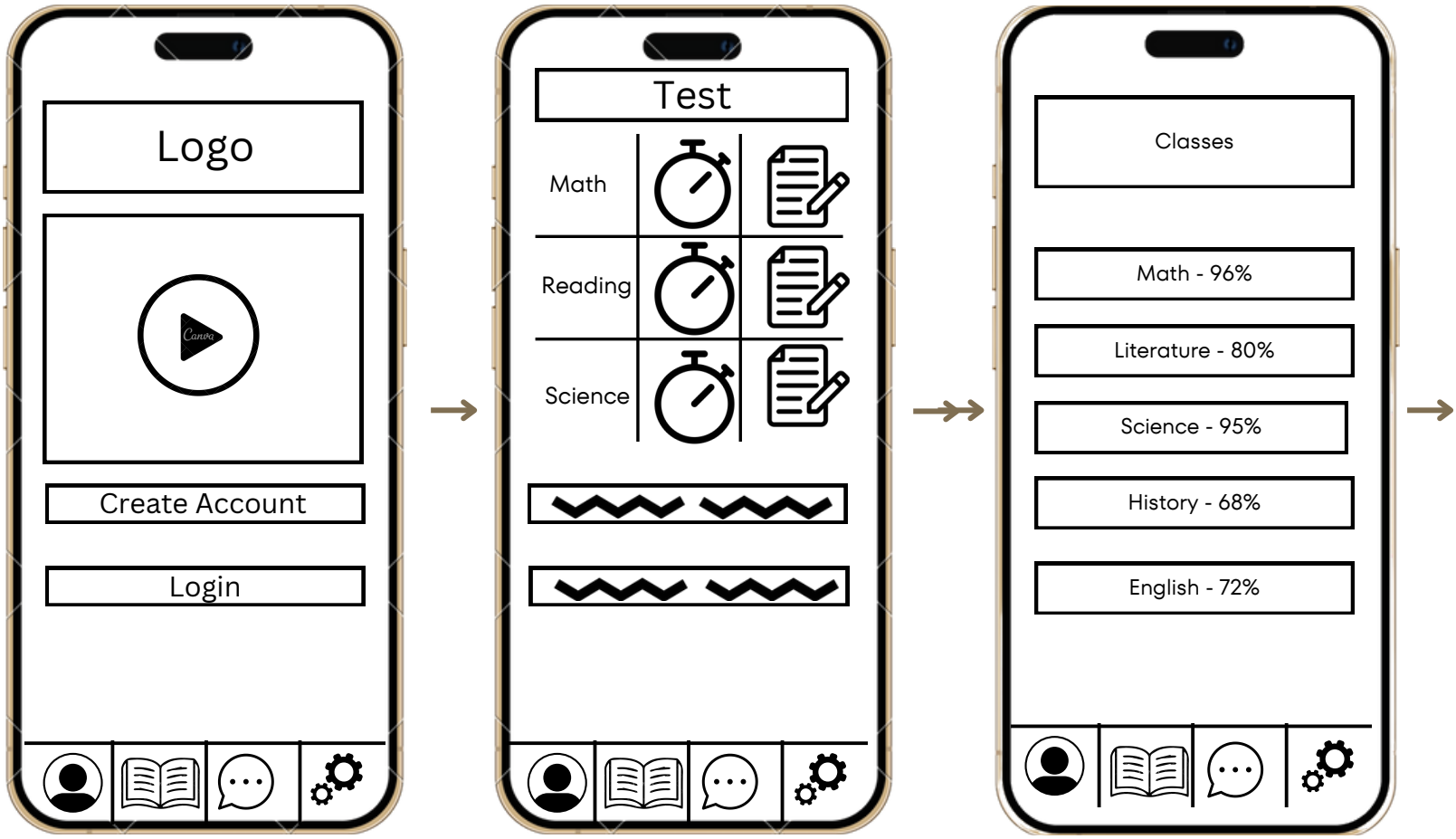



***Figure 6b.***
***Canva Low-Fidelity Screens***

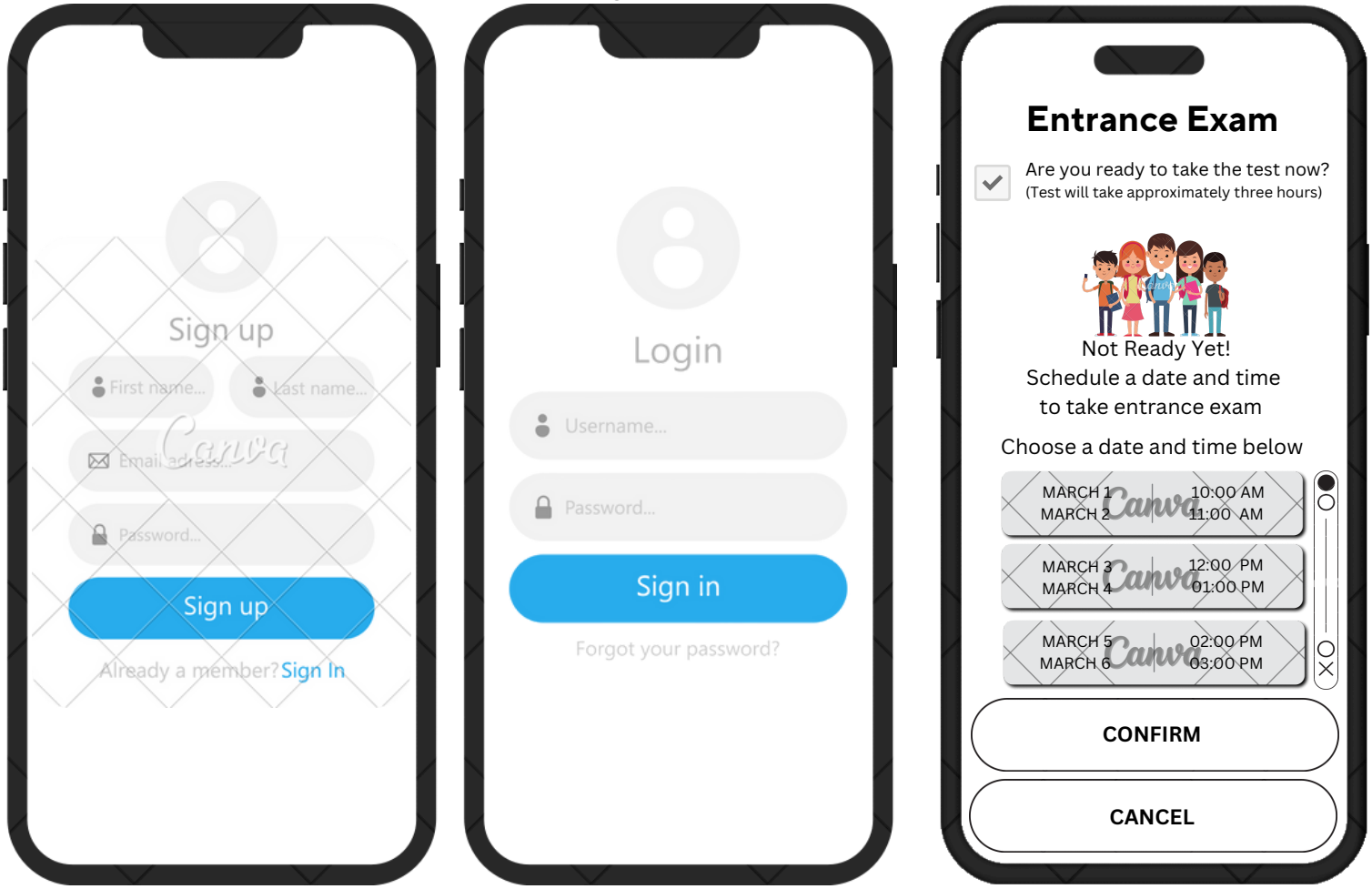
# HIGH FIDELITY 1

To continue we started by adding colors and a streamlined visual representation of the profile account sign-up page and entrance exam page. During this phase, we continued to use Canva as this was an easy tool to use during a constant revision process. We were able to collectively evaluate visual design decisions. See how colors, typography, and images work together. experiment with various styles, and evaluate the visual consistency of design.

Next, we wanted to ensure that all screens in our app were modern and created a user flow that was easy to understand and easy to use for beginner-friendly users. We continued to evaluate the accessibility of our design while allowing users with capabilities to navigate effortlessly. Below we identified that it may be beneficial for users to select a day/time to take their initial entrance exam if they were not prepared to do so at the moment, this gives the user flexibility.

***Figure 6c.***

***Canva High-Fidelity Screens***

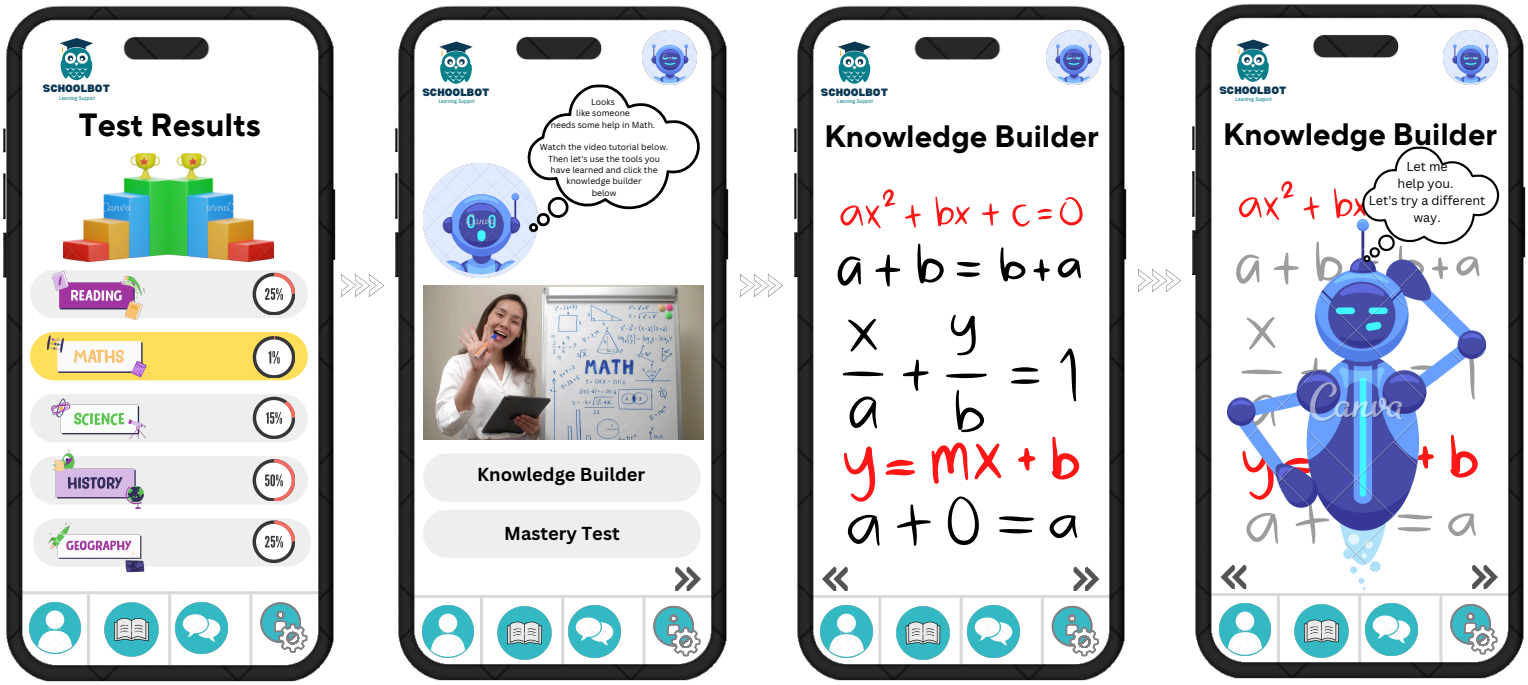


# HI FIDELITY 2

In Figure 6d. below started to implement more screens and began to introduce our Co-Creative AI element. Our AI bot is seen on the screens interacting with the user throughout the learning journey. The AI Bot will communicate with the user as seen using the speech bubble, helping the user learn the curriculum and providing assistance if they get stuck on a section of the curriculum. The AI visualization we chose is a futuristic robot, we believe that this representation was fun for young learners and comprehensive for more mature learners/users. As we continued to revamp and restructure the application we moved our design prototypes to Figma software to build an interactive app as seen in Figure 6e. Using Figma not only allowed us to create a detailed, interactive app but also allowed us to make revisions quicker and test them within the group and with our test users within our focus groups. The studies were critical in providing feedback to develop changes within our prototype; from the research, we improved our prototype.

***Figure 6d.***

***Canva High-Fidelity Screens***



# HI FIDELITY 3

The changes included overall adding more signifiers so users can easily navigate through the application. One example, was adding words listed on the course page to indicate the subject. Another change was adding terms of conditions, so users are aware of the legal and ethical implications within our app. Adding more modifiers, for example we added another page to indicate the ending of the entrance exam before the curriculum is shown. Changed the path of the Schoolbot logo to be clickable and a button to access the AI chat page. Making sure the user journey within the app made logical sense, some examples include changing the path after the entrance exam and making sure all submit answer buttons routed the correct page accordingly.

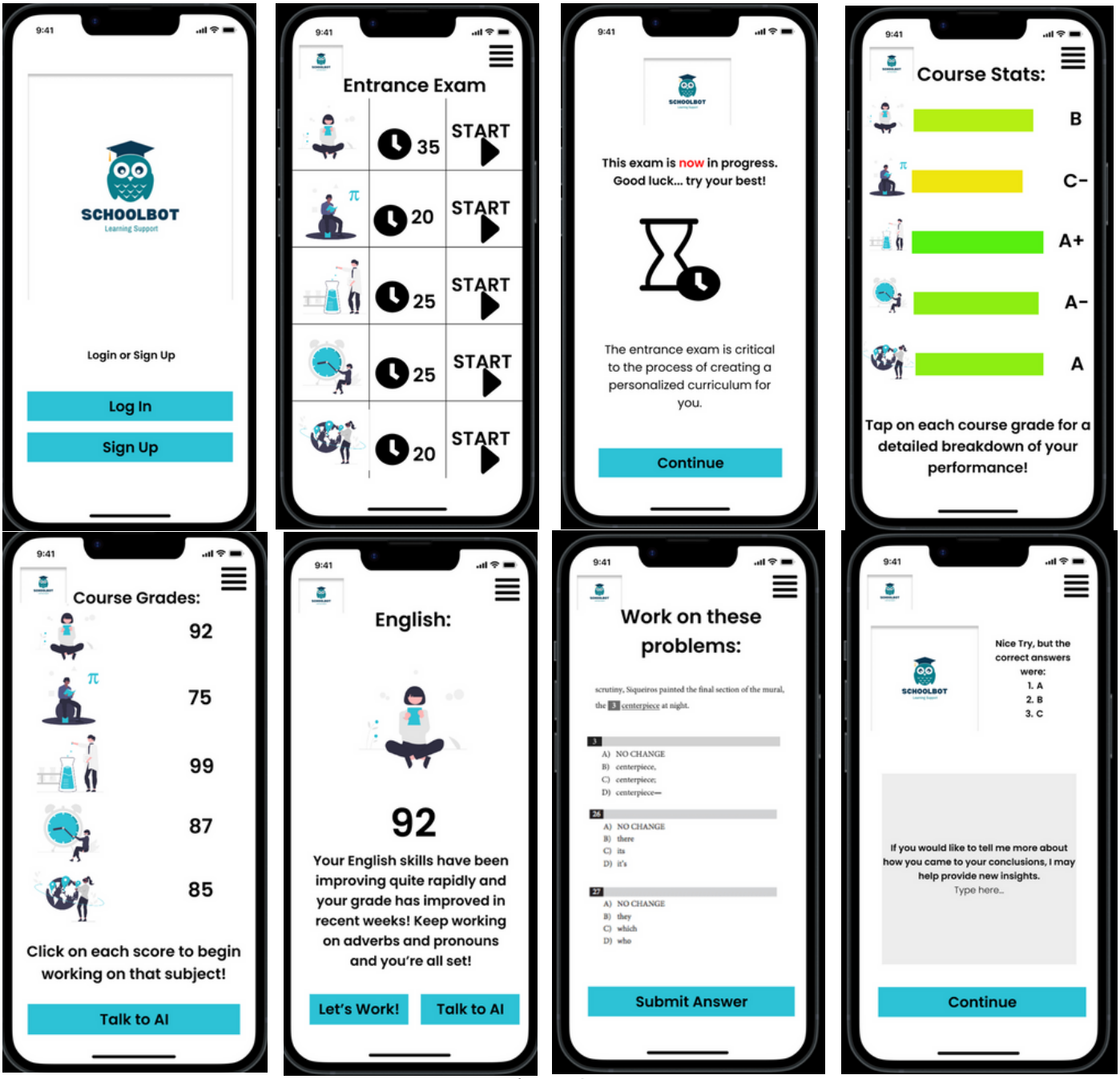



***Figure 6e.***

***Figma- Interactive High-Fidelity Screens***


# PROTOTYPE DESIGN

In closing, the prototype design went through a rigorous amount of developmental changes which allowed users to: Users will be able to complete an entire kindergarten-12 curriculum with assistance and guidance on the AI based on the curriculum, users will be able to interact with AI to ask it questions in lieu of a human teacher, user can track progress over months or years regarding their academic progress while the AI actively adapts to the user's needs. The users' parents/guardians will be able to review the collection of data and also the terms of conditions of the application.  Overall the testing and developmental growth of the SchoolBot app have made changes that will prepare the user for an enjoyable and comprehensive learning experience


# EVALUATION ANALYSIS

To better understand our target audience and identify areas for improvement in our app and prototype, we conducted user studies that involved collecting feedback from a diverse set of k-12 students, including those from non-conventional backgrounds. To gather this feedback, we designed 4 different tasks for users to perform within our app and recorded their live reactions and feedback, along with the time taken for each step. We also conducted post-task interviews to gain valuable insights, opinions, and constructive criticism from the participants. Through this approach, we were able to gain a deeper understanding of our target audience and their needs, which was critical in shaping the future development of our app.

# USABILITY STUDY

Main goal: The main goal of the study was to gather usage data from sample consumers that will allow us to better understand the needs of our target audience and allow us to serve them best. Gaining feedback and find areas within our app and prototype that may need improvement. A second goal will be to test how easily our users will be able to use and interact with our application on a consistent basis.The adhering user data will be sourced by mock user testing of the prototype application by the participants. Participants will be provided with a basic overview of what the app is and what it may be used to accomplish before being given a short set of tasks to complete using the app.

We provided all participants with the same narrative to introduce our topic. “We are designing a mobile application to improve access to education and foundational concepts for K-12 students and adults in the workforce. Our application utilizes a co-creative AI to help create a custom syllabus for each user based on their learning needs and individual use case. We would appreciate your assistance with testing our application to ensure that it works properly and efficiently. We will provide you with a link that will allow you to view and interact with an early version of our SchoolBot application. While navigating through the application we will assign different tasks with an allotted 3 minutes to complete each task. These tasks will not be difficult or stressful but will allow us to answer important questions we have regarding the design of our application. The testing session will be video and audio recorded in addition to a recording of the user’s interactions with our application. We will not collect personal information, and recordings captured will not be shared. Recordings will be used for transcriptions, edits, enhancements, and redesigns that may pertain to our SchoolBot application in order to better fit user needs. We will be glad to address any questions or concerns regarding this process, and we thank you for your participation.”

# USABILITY STUDY

A protocol, was crucial to help us plan this study accordingly and efficiently. During our application testing, we assigned our testers four different tasks to complete. The first task was to navigate to the help page where the user can interact with and discuss with the AI. We gave the user 2 minutes to complete this task and record which method they utilized to access the chatbot tab. The second task was to create an account and complete the entrance exam within 2 minutes. For the third task, we asked the user to choose any course subject to work on and submit an answer while asking the AI for assistance. Lastly, the fourth task wasl required the user to interact with the AI utilizing the chatbox to ask for more resources to solve problems or ask questions. Each task was given a 3-minute time limit. In case the user got stuck during the task process, we allowed them to attempt to figure out the issue until the 3 minute timer for that task runs out. We will then record their stopping point and analyze the captured data and user behavior. After completing the tasks, we asked the users to rate the difficulty of each task on a scale of 1-10 and which tasks they enjoyed and found easiest to conduct. To ensure consent, we will provide the testers with an emailed contract that they were able to sign before they begin the testing process with us.

# USER QUESTIONS

**We conducted post task questions, asked after each task:**

**Task 1: Navigating to the Help Page.**

1. How easy or difficult was it to find the "Talk to AI" chatbox?
2. Did you encounter any challenges navigating to the "Talk to AI" chatbot? If so, what were they?
3. Did you find the layout/ design of the home screen easy to navigate?

**Task 2: Creating an account and doing the Entrance Exam.**

1. Did you find the instructions provided clear and easy to follow?
2. Was the process of creating an account/taking the exam straightforward and user-friendly?
3. Is there anything you would suggest to improve the account creation and entrance exam process?

**Task 3 : Choosing a course subject and submitting an answer.**

1. How easy or difficult was it to choose a course subject and submit an answer?
2. Did you encounter any challenges while completing the task? Or was it straightforward?
3. Were the buttons throughout choosing a subject and submitting an answer clear?

**Task 4 : Interacting with the AI through Chatbox.**

1. Were the chatbox's responses accurate and relevant?
2. Did you find the chatbox easy to use? or was it challenging?
3. Is there anything you suggest to improve the experience of the chatbox interaction?

**After all tasks were completed, we then conducted follow-up interview questions:**

1. *Rate the difficulty of each task on a scale of 1-10.*
2. *What tasks did you enjoy and why?*
3. *Which was the easiest to conduct? and why?*
4. *Which tasks was the most difficult and why?*
5. *Can you describe your overall experience of using the SchoolBot App?*
6. *How did you feel about the overall design and layout of the app? Was it easy for you to navigate and find everything?*
7. *Did you find the instructions provided for each tasks easy and clear to follow?*
8. *Were there any specific moments during your interaction with the app, where you felt confused or frustrated? If so, explain.*
9. Was there any features or anything that you wished was included in the app or did you feel was missing?
10. Is there anything else you would like to say about the app?

# DATA COLLECTED

## Number of participants and their demographic data in a table.

| User ID | Participants | Age | Socioeconomic Status (family income breakdown) | Gender | Grade | Home/Public School | College prep, Exam prep or Study Resources |
|---|---|---|---|---|---|---|---|
| 001 | 1 | 16 | Lower Class >$52,200 | Female | 10 | Public | Study Resources |
| 002 | 1 | 7 | Lower Class >$52,200 | Female | 5 | Public | Study Resources |
| 003 | 1 | 22 | Middle Class $52,200 - $156,600 | Male | College | Public | Study Resources |
| 004 | 1 | 14 | Middle Class $52,200 - $156,600 | Male | 9 | Public | College Prep |
| 005 | 1 | 8 | Upper Class <$156,600 | Male | 4 | Private | Study Resources |
| 006 | 1 | 16 | Middle Class $52,200 - $156,600 | Female | 10 | Public | Study Resources |
| 007 | 1 | 17 | Middle Class $52,200 - $156,600 | Male | 12 | Public | College Prep |

## Quantitative data, Time to complete the task for each participant

| User ID | Task 1 (In Seconds) | Task 2 | Task 3 | Task 4 | # of times requested help | # of questions answered |
|---|---|---|---|---|---|---|
| 001 | 36 | 82 | 118 | 19 | 0 | 4 |
| 002 | 39 | 42 | 38 | 68 | 0 | 3 |
| 003 | 29 | 64 | 32 | 25 | 0 | 2 |
| 004 | 50 | 110 | 24 | 70 | 0 | 4 |
| 005 | 58 | 126 | 48 | 81 | 0 | 1 |
| 006 | 40 | 115 | 36 | 65 | 0 | 3 |
| 007 | 49 | 110 | 42 | 70 | 0 | 5 |

# DATA ANALYSIS

The user studies conducted provided valuable feedback that allowed for changes to be made in the schoolbot prototype AI app. Positive feedback indicated that the app and layout were easy to use, accessible, and self-explanatory. However, negative feedback highlighted the need for more signifiers and modifiers, which confused some participants in certain areas. Based on the feedback, it was recommended to add more signifiers to help users navigate through the application. For example, adding words listed on the course page to indicate the subject.

Additionally, participants recommended adding terms and conditions to the app, similar to CHATGPT, to make users aware of the legal and ethical implications. The app journey was another area of concern, with participants suggesting changes to ensure logical sense, such as modifying the path after the entrance exam and ensuring all submit answer buttons routed to the correct page. Finally, participants suggested making the schoolbot owl logo more clickable and essential to the app. These recommended changes will help to improve the app's user experience and ensure it is more user-friendly and intuitive.


# EVALUATION ANALYSIS

In conclusion, the user studies conducted on the schoolbot prototype AI app highlighted the importance of effective user feedback in the app design process. The feedback provided by the participants was instrumental in identifying areas where changes could be made to improve the user experience. By adding more buttons, signifiers, terms and conditions, and improving user paths, we were able to develop important changes to our prototype. It was important to value the participants and their feedback as it helped us gain a deeper understanding of how our app functions for the users. As designers, we will continue to prioritize user feedback to ensure that our app is user-friendly, intuitive, and meets the needs of our target audience.


# ETHICAL ISSUES

There are numerous ethical issues that one must consider regarding the potential use of AI within application such as ours. Some of these issues include: privacy and data storage, transparency, environmental impact, cultural impact, and inequality regarding resources . Throughout this report we will continue to address some of the important factors when discussing the use of artificial intelligence and how we can best mitigate the issues related to our application and its ethics. While this might the last section included in the report, it is far from the least important. Addressing ethical issues is critical to the longevity of our application, because if ethical issues became severe, it could derail our application.

# ETHICAL ISSUES

Bias and cultural impact is a significant issue in the world of technology and the education space in particular. It is crucial to the success of our application that we limit this issue as much as we can in order to give our users the best experience that we can provide them. One way to help address bias is to use comply modern and up to date data in order to train our AI. Older data can include biases in the information that would then in effect train the AI incorrectly. By using appropriate data to train our AI, we can hope to avoid some of the more common pitfalls when working with interactive AI applications. The cultural impact of AI can also not be ignored. Since our application is intended to include users of all different backgrounds and cultures across the globe, we have to be cognizant off the differences between cultures. For example, something that culturally would seem normal or common in the West might be seen as strange or even offensive in a country like India. The way we are addressing this issue is by utilizing a variety of the top teachers and administration experts across the globe in the development of our curriculum. By starting with a diverse group of educators from the beginning, it will help us reach the wide audience that we are targeting without harming them or potentially making them uncomfortable. Another way we will be addressing our cultural differences is via the advanced self-learning and deep learning capabilities our AI will utilize so that it continues to improve and grow better every day. In essence, our AI will be exponentially more advanced and aware of cultural issues and differences in 10 years than when we first publish the application. The final way we will address cultural conflict is by reporting any cultural issues to the general AI help bot, which will then take its own internal steps to make sure that user and similar users do not experience that same issue again. One way it will detect similar users, since we only collect limited user data to protect their privacy and security, is via the implementation of markers such as geographic location and age. We expect these aforementioned steps to mitigate the majority of issues that our users could experience regarding negative cultural conflicts and bias.

# ETHICAL ISSUES

The other major ethical consideration that is a concern to users of any mobile application or technology is in regard to privacy and data storage. Privacy and data storage has been a major factor in all sorts of technology lawsuits and government investigation s over the past decade and our goal is limit that issue as much as possible. When the user first signs up we provide them with a detailed but easy to understand terms and conditions that describes how we will use that data. The user is not allowed to interact or operate with any portion of the application until they have read and signed off on the terms and conditions. We also only ask for limited user data from the sign-up page itself. The data that we require from the user is as follows: Name, Email, Date of Birth. Even the limited data that we collect is not distributed our shared with any third parties so our users can be assured that their data is not sent or utilized by the wrong hands. This is especially critical for our application specifically because we deal almost exclusively with children, thus the increased emphasis on data privacy and security. Another issue that needs to be addressed is inequality regarding resources. When dealing with the fact that 1 out of 6 children live in extreme poverty, it becomes clear that not all children will have similar access to things like educational and technological resources. Obviously, our application addresses the first issue of education but unfortunately since the medium that we are using is mobile technology, not everyone will have equal access and opportunity in regard to our application. While we cannot just give every impoverished child a mobile device to access our application, there are other steps that can make a similar positive impact. The first step that we took to address this issue is to ensure that our application works with a variety of older and different mobile devices. Our mobile application is designed to work on devices dating as far back as 2012. This allows us to have a larger potential user base, since a lot of older mobile devices are significantly cheaper than their newer counterparts.

# ETHICAL ISSUES

Another way that we are seeking to mitigate this issue is via scholarship opportunities and sponsorships with local and international businesses. Once our application grows in size, we will offer more and more chances and opportunities for underprivileged students to receive a free or subsidized device to begin using our education platform. We also hope that we will be able to partner with local and international businesses that care about the common goal of quality education in order to supply underprivileged children with the necessary tools and resources to be able to use the SchoolBot AI Mobile Application. The ethical issue of transparency also comes into play with our application. Many larger technology companies have come under fire recently by the government and media for the lack of transparency within their relations and interactions with their users regarding privacy and data usage. We addressed a similar issue earlier in this section but the remedy remains the same. We will main full transparency with our user base via clear and concise announcements every time the application is updated and maintain the aforementioned data protections. The final ethical issue our team had to consider was in regard to the environmental impact of our SchoolBot AI Application. Both the storage of our applications data and the maintenance of our servers will require significant energy, thus contributing to the environment in a negative manner. While we can use more efficient forms of energy such as solar, there are not a plethora of steps that we can take to reduce the energy impact. While we are not saving energy by utilizing our specific application compared to a regular brick and mortar school building, we are making a positive environmental impact in other ways. Since the application and all its features can be accessed purely from the user's home or dwelling there is no need for the daily comment to school. This will inevitably have a positive environmental impact from the gas saved. Another positive feature environmentally in regard to our application is with the amount of paper and similar resources saved over the course of a thirteen-year academic career. The effect on paper saved itself is enough to validate our application as a positive step towards improving the quality of the environment.


# ETHICAL ISSUES

Overall, our mobile application had numerous ethical issues to address over the semester of development but have managed to address each one to the best of our ability. Our hope is that addressing these issues will help us give our users the best overall experience when interacting with our application. The ethical issues of privacy and data storage, transparency, environmental impact, cultural impact, and inequality regarding resources will all continued to be addressed in our application is it continues to grow and improve. The AI we are utilizing will also continue to help us to make the necessary updates and improvements to keep potential ethical issues at bay. We are excited to be an application that places a priority on and addresses important ethical issues so our users can have their desired experience utilizing our SchoolBot AI Application.

# APPENDIX

# TRANSCRIPT

Me: Hi, I will be showing you a presentation and give you some context for this user study.

Me: Okay this is our schoolbot app, this is for my interaction studio course where we are creating an education AI app. The main goal of this study will be to gather usage data from sample consumers that will allow us to better understand the needs of our target audience. Our target audience would be k-12 students, anyone from that age range that attends school. It's basically so we can better know and understand our users.

We're gonna give you for 4 different tasks. I'll be asking you questions to gauge how easy or hard it was for you to get through these tasks. So your feedback matters.

Participant: Okay

Me: Let me give you more background, we are designing a mobile application to improve access to education and foundational concepts for K-12 students and adults in the workforce. Our application utilizes a co-creative AI to help create a custom syllabus for each user based on their learning needs and individual use case. We would appreciate your assistance with testing our application to ensure that it works properly and efficiently. I have sent you a link to our prototype in figma. You will get 3 minutes for each task, they are not difficult. These tasks will not be difficult or stressful but will allow us to answer important questions we have regarding the design of our application.

Me: I will not display your face to others and will only transcribe your words. I also want to emphasize that all of this is consensual, so if you no longer want to participate or have any concerns, please let me know.

Participant: “No, I don't have any questions.”

Me: Okay we can start, go ahead and open your email and click on the link and then wait for my instructions.

Participant: Okay Im here

Me: Be present throughout this meeting, and during the time using the application, and please share any thoughts or feelings. If you are confused, don't be afraid to speak out as it will help us. Thank you for cooperating with us.

Me: Now if you could share your screen, I'll allow you access to it shortly.

Me: Okay now you are co-host and should be able to share your screen.

Participant: Can you see my screen?

Me: Okay, perfect. I can see your screen now. Stay right there until my instructions.

Do you have any questions before we begin?

Participant: Umm, no.

# TRANSCRIPT

**Task 1: Navigating to help page**

Me: Okay the first task we'll assign you is navigating to the help page where you can talk to the AI utilizing the chatbox. We will give you 2 minutes to complete each task. You will start on the home page.

Me: Okay go ahead and start

Participant: Okay

Participant: You said I'm supposed to be talking to an AI right?

Me: Yes, through the chatbot

Me: Okay, perfect! I'll go ahead and stop right there. Congrats you've completed the first task we gave you

Participant: Do you want me to go back?

Me: No you can stay there for now

Me: So for task 1, How easy or difficult was it to talk to the AI bot?

Participant: I feel like it be easier if it was actually phone where I can type, but it's pretty self explanatory

Me: Could you explain more?

Participant: It would be easy if it was an actual app on a phone but it's really self explanatory everyone knows what the menu means or what the help means like the instagram app for example.

Me: Yeah I did notice you were struggling with messing around with the buttons. Just a disclaimer this is a figma software for prototypes and everything that is highlighted are functions you can click. If it's not highlighted, you can't click it.

Participant: Ohhhh that makes sense

Me: Okay, Did you encounter any challenges navigating to the chatbox? Or did you encounter any challenges? If so, what were they?

Participant: No, not really.

Me: Did you find the layout or design of the home screen easy to navigate?

Participant: Yeah, but some kids might try to click on the logo. Like I wasn't sure If i was supposed to talk to the AI. On the home page, at first I thought the AI was the logo.

Me: Would you like to further collaborate?

Participant: Yes, at first I thought the AI button was the logo

Me: Thank you, that was very helpful

Me: Now that we've created the first task, we will do the second.

# TRANSCRIPT

**Task 2: Creating an account and doing an entrance exam.**

Me: We will move on to the first task which is creating an account and doing an entrance exam.

Me: Just so we can start in the beginning, could you go back to the home page. Okay go ahead and start, so you'll be creating an account and starting the entrance exam.

Participant: Okay, got it.

Me: Okay now we'll stop.

Me: That right there was the entrance exam. I'm not sure if you noticed but after the exam it prompted you to study different subjects like history and science.

Me: Did you find the instructions provided clear and easy to follow?"

Participant: "Yeah, it was pretty easy"

Me: Was the process of taking the entrance exam easy and straightforward?"

Participant: "Yes , but uhh what course is this supposed to be?"

Me: "Oh, that is supposed to be history and the one below that is geography"

Participant: "Ohhhhhh that's geography? Oh I did not realize "

Me: Thank you for your feedback

Me: Did you find the Layout or design easy to navigate?

Participant: "Yeah but uhh can I add on something"

Me: Yes, sure you can

Participant: "This isn't my app, but like you see where the middle space is at (the course grades) maybe like add words saying this is history or this is science"

Me: "I see what you mean, so do you mean like add words right beside the subject logo/picture?"

Participant: Yeahhh

Me: That was helpful, thank you.

# TRANSCRIPT

**Task 3: Choosing a course subject and submitting an answer**

Me: “Okay, we'll be moving on to third tasks. We'll be choosing any course subject to work on and submitting an answer while asking the AI for assistance. Since you already created an account, you can go ahead and login instead of signing up. Go ahead and start..

Participant: Hmm.. okay.

Participant: “Wait, let me do that again”

Me: Did you find the instructions provided clear and easy to follow?

Participant: Yes

Would you like to elaborate, was it easy or straightforward?

Participant: (Participants plays around with buttons again) Ummm.. OHHH I get it, I definitely get it, this is very easy.

Me: Okay to just explain this app and give more background, you start with an entrance exam and gain results then the AI will provide a personalized curriculum based on those scores. So if you click a subject like math, that you may have done lower on, it will state you need to improve. Also for the Talk to the AI function, let's stay, you need help on a current problem then the AI could say let's work on more problems to improve.

Okay, let's move on...

Me: How easy or difficult was it to choose a course subject and submit an answer?

Participant: Uhh there were a few times I wanted to click on the logo instead of the number. It wasn't hard but I feel like some people might click the logo instead of the course number. It's pretty self explanatory, I understand though.

Me: Thank you, that was very helpful.

Me: Did you encounter any challenges while completing this task?

Participant: No uhh not really, probably just clicking on the icons

Me: Okay thank you.

Me: Were the buttons throughout choosing a subject and submitting the answer clear?

Participant: Yeah like the let's work button and talk to AI. Can you talk to the AI about the current question you're working on?

Me: Yes, you can, for example so the AI can state the wrong answer and then it’ll explain why it's wrong.

# TRANSCRIPT

**Task 4: Interacting with the AI through chatbox**

Me: The next task, the last, you'll be utilizing the chatbox to ask for more resources to solve problems or ask questions.

Me: Sooo now you can go.

Me: Okay and perfect!

Participant: Oh

Me: Now I have some questions, were the chat boxes responses accurate and relevant?

Participant: Yeah and the AI kept asking more questions to be more precise so they can be more accurate and precise with their response

Me: Did you find the AI easy to use or was it challenging?

Participant: No it was self explanatory

Me: Lastly, Is there anything you want to recommend to improve the experience of the chatbox interaction

Participant: No, but I now realized there is another way to talk to the chatbot ai.

Me: Yes, correct, it's the same AI you're talking to, just different ways to access it

Me: How would you rate the first tasks, Navigating to help page, for difficulty on a scale of 1-10

Participant: It was like a 1.

Me: The second task was creating an account and doing the entrance exam. How difficult was it?

Participant: It was a 1

Me: The third task was choosing a course subject to work on and asking the AI for assistance, how would you rate the difficulty for this?

Participant: It was like a 1?

Me: So it was very easy?

Participant: Yeah

Me: The last task was Interacting with the AI through chatbox. How difficult was it

Participant: It was pretty easy, you just kind of just write what you want to say and the AI writes you back

Me: What tasks were the easiest and why?

Participant: Talking to the AI, because you just say what you want to say and it's pretty easy to access it

Me: What task was the most difficult?

Participant: I would not say it's difficult but pressing the course grade icons and the numbers while choosing a course subject. I guess the logos make sense, but before you said It I did not recognize them. It would help to add words for every course.

Me: How did you feel about the overall design in the app?

Participant: Well it's pretty simple, it feels like any other regular app or any other school app.

Me: Is there anything else you would like to say about the app?

Participant: Yes I like it.

Me: Any moment that you remember where you were super confused, it's okay if you were?

Participant: No

Me: Okay, you can now exit the figma website and stop sharing your screen. You have now completed our user study. Thank you for your time and participation. Your feedback and participation was very important and helpful. That's it, I'll go ahead and let you go, thank you.

Participant: Okay byee!