

2h: Final Report

CSE 440 AB

Teran Long, William Eng, Thomas Pham, Boyan Li: 25% writing report

5/10/2019

# Final Report

## 1. Team:

Distraction Destroyer

## 2. Each Team Member's Name and Role(s)

Boyan Li: UX designer / researcher

Thomas Pham: UX designer / researcher

William Eng: UX designer / researcher

Teran Long: UX designer / researcher

## 3. Problem and Solution Overview:

When a person becomes distracted from their work, hours of productivity can be lost. All of this lost time could bleed into other aspects of a person's life, which in turn could come back to negatively affect their studies. Thus, a vicious cycle of playing catch-up is created. What we propose is a solution that removes distractions from a person's environment, motivates them to work, and helps them focus. The design we choose in the end is an wearable Mixed Reality (MR) device (headset) with an application on it that allows users to virtually adjust and modify their study environments so that they may be productive and distraction free throughout the course of their study session.

## 4. Design Research Goals, Stakeholders, and Participants:

The goal of our design research is find out what distractions people experience and in what environments people focus better. Find out how people currently deal with these distractions, and how they wish they could deal with these distractions. The people we are trying to target with our design are undergraduate students at the University of Washington. Other stakeholders might be software engineers that work in an open office space, or graduate students at the University of Washington. We conducted four design research interviews with four individuals. All participants are young (19 - 23) and tech-savvy. Two participants are undergraduate students from the University of Washington, one participant is a first year Ph.D. student at the University of Washington, and the last participant is a full time software engineer at Google.

**Participant #1** is a first year undergraduate student applying to ACMS and CSE. He works part time at a restaurant and takes 2 stem classes. The interview was conducted in a small room with one or two other people studying there too. Participant 1 likes to study where other people are focused -- social pressure helps him focus. He likes natural lighting and a little bit of elevation and his favorite study spots are Law Library, Odegaard Library and Suzzallo Library. He is most often distracted by his phone - notifications interrupt his work flow, laptop - it is easy to get away with, people goofing off around him, ambient noise, and people walking by. He thinks other people are most

distracted by social media. In order to deal with some of these distractions, participant 1 puts his phone face down on the desk and uses earbuds. His ideal working environment includes lots of windows and plenty of light, plenty of table space, plenty of outlets, comfy seating, and books around the environment. Participant 1's ideal way to handle distractions would be to have the mental fortitude to ignore distractions.

**Participant #2** is an undergraduate senior at the University of Washington who is studying biochemistry and is a pre-medicine student. This interviewee also works part-time as a medical scribe. The interview was conducted at a table in the Odegaard library. There were other people nearby studying or chatting. However, overall the environment was not too loud but rather just had a little background noise. For this participant, the main distraction this person faces is his smartphone due to social media. He gets curious as to what people are doing therefore tends to use social media apps such as Instagram, Twitter, and Snapchat on his smartphone. Other distractions consist of being around people who are talking or not studying, music being played, and bad smelling scents. He finds himself more motivated to focus on his work when he sees other people are focusing on their work. He believes the ideal environment for him would be to have an isolated cubicle with glass walls while being able to see other people study.

**Participant #3** is a first-year Ph.D. student in UW's CSE department in his early twenties. He is from and completed his undergraduate education in Austin, Texas. He is currently doing research on program synthesis. The interview was conducted in the old CSE building in a lounge. There were two people studying quietly around us, and people walked near our area a few times, but overall there was very little background noise. Since he gets paid to do conduct his research, he chooses to work around 40 hours a week on it. Each week, he attends meetings with his research advisor and team. This participant stated that where he chooses to work is very heavily dependant on the type of work he has (e.g. quiet place for reading documents, collaborative place for problem-solving). The biggest thing that distracts him are breaks that take too long, mainly due to his phone. One way he combats this is by trying to work around other people who are also working; in this environment, he feels a social pressure to be productive, and is less likely to go on his phone. Another strategy he uses is the pomodoro method, where he times himself working for 25 minutes, then takes a break for 5 minutes. This helps him stay on track while limiting the time he is allowed on his phone.

**Participant #4** is a full time software engineer at Google in her early twenties, and she works in an open space office. The interview is conducted in a quiet study room with no other people around. She told us she concentrates well when other people around her are focused on their work because peer pressure from colleagues makes her productive and there would be fewer distractions like non-work related chatting or people snacking. She told us her biggest distraction is Youtube, especially when she is working from home because it is easy to lose track of time and waste a few hours. Another type of distraction she talked about are phone notifications, because someone could reach her on social media and they could talk for an hour. She also gets distracted by incidents (e.g. car accidents) happening outside of the office window, but she would like to keep this because she thinks they are nice breaks from long hours of working. She prefers different environments for different tasks. She doesn't like to confuse functions of different environments because she would be distracted by those other activities. Her ideal solutions to deal with distractions are to remove distractions completely instead of mentally training herself because it is more straightforward.

**Our chosen research method was interviewing**, because it is efficient to implement and it allows us to gather more information in a limited amount of time than other methods. We chose the students because we felt that they are a group that needs to consistently be focusing. We chose to interview both undergraduate and graduate students to try and understand the different problems that each might face when doing work. Finally, we decided to also interview a software engineer because we thought that they might have similar problems related to focus that students also face.

## 5. Design Research Results and Themes:

**People are more focused working and studying around other people who are also focused on their work or study.** Prior to our research, we did not consider this as a factor that could affect productivity. However, all four of our participants reported that they are more focused when others around them are doing so. The main reason why they feel this way is because they become more motivated to be productive under peer pressure, which they feel being held socially accountable by people around them. It is important others around are focused on work or study instead of doing other things like chatting, otherwise, these people become sources of distractions such as noise or their conversations could lure people in and interrupt their work or study. This theme suggests the following task to design for: having the sense of working or studying around other people who are also focused on their work or study.

**People's biggest distractions are applications, social media, and websites they could access on their mobile phones and laptops.** It is no coincidence that all of our participants listed this as their biggest distractions. Participants find themselves frequently distracted by phone notifications, social media, and non-work related website like Youtube. They reported that their train of thoughts are interrupted by notifications, and it is really easy to lose track of time when going on the phone or Youtube for a break. Not surprisingly, all four participants mentioned that other people they know are also distracted by these digital distractions and they believe it is because people do not multitask well. Furthermore, these things have become so easy to access in the last decade, which drastically increases their impact in population. This theme suggests the following task to design for: avoid or restrict using non-work related apps or going on non-work related websites on phones or laptops when working or studying.

**People prefer different environments for different tasks.** All four participants reported that they prefer different types of designated environments for different types of work or study. In general, to process information such as reading and sometimes writing, people prefer quiet space somewhat away from other people; to perform problem-solving tasks such as programming and group projects, people like places with people with whom they can collaborate. In addition to that, we found people like functions of environments separated, for instance, when they work should not be where they watch TV. Participants said they were not productive working at home or in their rooms because they are too relax there and they couldn't help but do some of the other activities they perform in those places such as snacking, watching TV, play games, and even sleeping. They like doing these in different environments because they like having the right mindset when in those environments. This theme suggests the following task to design for: adjust environment for when an individually needs to perform different tasks such as process information vs. problem solve.

We did not discover any new themes from considering our design research in our design process.

## 6. Answers to Task Analysis Questions:

### Task Analysis Questions

#### Who is going to use the design?

Students who have desk work (e.g. reading, coding assignments, etc.) that require high levels of focus to complete will use our design. In addition to benefiting college students, our design will also work well for office workers that needs to focus on completing their work.

#### What tasks do they now perform?

At the moment, people perform a number of task to try and avoid distractions. People can opt to use noise-cancelling headphones or earbuds to block out distracting sounds. If they are losing productivity because of

their phone notifications, they can turn their phone on “Do Not Disturb Mode”. Additionally, if they find themselves distracted by particular apps, they can use an app-locker to temporarily disable select apps. If they find that they cannot focus in their current environment, people can physically move locations to try and find a place more suitable for their study habits. Though they may run the risk of appearing rude, people can ask individuals around them to be quiet. Finally, people can simply try to ignore distractions around them.

#### What tasks are desired?

People want to do their work in a place where other people are also doing the same. Doing this introduces a social pressure for them to complete their own tasks. People want to be less distracted by their non-work related apps or websites, which may require them to be uninstalled or temporarily blocked. People also want to work in different places for when they have different types of work (e.g. quiet area for processing information, collaborative area for problem-solving).

#### How are the tasks learned?

Through years of education and learning experience, people have already learned how they best focus and what things they are most distracted by. Tasks can be learned by following on-screen directions and stepping through the tutorial.

#### Where are the tasks performed?

The tasks are performed at stationary work and study locations such as desks, couches in offices, cubicles, work offices, libraries, coffee shops, and other types of rooms.

#### What is the relationship between the person and data?

The data consists of the environment, all the lights and sounds in a room, and everything that the user sees and hears. The data can also consist of collecting app and website usage data from a user to determine what his or her biggest digital distractions are and can be used to help eliminate those distractions in the future. User behavior data and data on the environment that leads to these distractions can also be collected. For example, if the user suddenly puts down his or her work and turn to look at something, then that could be a potential distraction. The data is all the different distractions the person might have while working/studying. It is the environmental stimulus (e.g., noise, background music, conversations, etc) that leads to better or worse focus for the user. The user generates data through their working or studying behavior, and reviews it to learn how they were distracted during the session.

#### What other tools does the person have?

Other tools to which the person have are noise cancelling headphones, a physical study space, a “Do not Disturb” mode on their phone, and apps that locks other apps on their devices. Noise cancelling headphones can be used to cancel out noise to focus better on tasks. Physical study spaces are used to work and study in a stationary manner. A “Do not disturb” mode on a smartphone blocks out notifications until the mode is turned off, as this helps to improve one’s concentration on tasks. Apps that locks other apps on their devices is another tool, as these apps help people to not go to certain apps to which distracts them such as social media apps.

#### How do people communicate with each other?

People communicate with each other by informing others that they will start working on a task, by informing others to stop bothering them and to be quiet, or they work alongside other people. When a person informs others that they will start working on a task or to stop bothering them and to be quiet this person verbally communicates to others that he or she wants to focus on their work. When a person works alongside other people this person nonverbally communicates that he or she wants to focus on their work.

### How often are the tasks performed?

The tasks are performed every time people need to focus and finish their work in a stationary location. For each individual, this amount of time may vary. Most office workers will have ~8 hours, 5 days a week that they need to focus at a desk, but some may work after hours or weekends, while others may not spend all day at their desks. College students, on the other hand will vary even more. Some college students study at a desk all day while others only spend a couple hours per day, or even every couple of days.

### What are the time constraints on the tasks?

The biggest time constraint our design deals with is processing and filtering information from the environment in real time. We need to augment the user's environment, filtering out distractions and allowing the user to focus on the task at hand. We need to do this in real time so the user has a seamless experience rather than a laggy or frustrating one. When the user is studying, our design needs to quickly communicate important information to the user in an unobtrusive way. If another person tries to communicate with the user, but is being filtered out by our design, then we need to communicate this to both the user, and the other person, in a timely manner so that the person can take appropriate steps like come back later, or bypass the filtering. In the case the user needs to work or study, we need to communicate with others in a timely fashion so that they don't bother the user. Our design also needs to start and stop the focus mode in a timely manner. We don't want the user to have to wait too long to start studying and we also need to release any blocks we have on the user's content in a timely manner after the study session is shut down so that the user can resume normal life.

### What happens when things go wrong?

In the worst case, our design could augment or filter out too much of the user's environment resulting in an unsafe situation for the user (e.g. fire, active shooter, etc.). In a more likely scenario, this would only result in the user being oblivious to some valuable information from someone they didn't hear or see. On the other extreme, our design could augment or filter out too little of the user's environment resulting in the user getting distracted, and losing focus. If our design works really poorly then it could introduce new stimulus from the filtering and augmentation process that distracts the user where they wouldn't have been distracted in the first place.

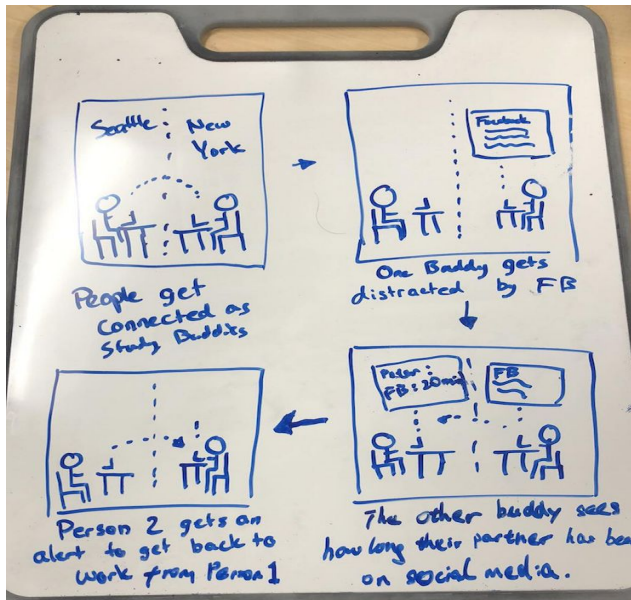
## **7. Proposed Design Sketches**

### **Design 1: Work Buddy System**

#### High-Level Idea:

The idea is to pair two people in different locations as study or work "buddies" for a study or work session. Both users are able to see the amount of time the other user has spent on mobile or laptop applications (although the sketches only showed laptop usage, the design should support mobile usage as well). When one user determines that their work or study buddy has been on non-work related apps or websites for too long, this user can send an alert to their work or study buddy and remind them to get back to work. Additionally, because buddies can see each other's app and site usage data, they could compare their data with those from their peers and know how well they are doing in this session.

## Sketches:



## How it Supports Our Tasks:

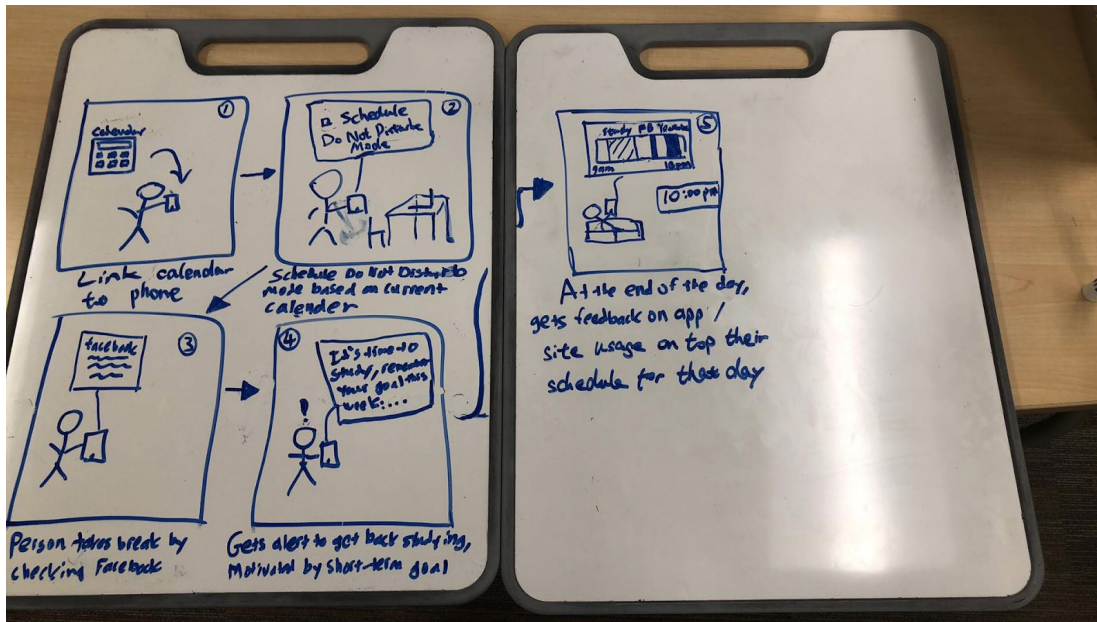
This design supports four tasks. For the first task, Feel Motivated to Work, users achieve this task by having their work or study buddy know what the other is doing when they are supposed to work or study. Each person should feel a social pressure to stay on task, and they will also serve as peer supervisors to hold each other accountable. For the second task, Understand How Media Impact Focus and Productivity, the user achieves this task by receiving tracking information on which apps or websites they are using during the study or work session, and how long was spent on each. By knowing that and how much work they have gotten done in that session, they can understand which media has the biggest impact on their work, and therefore be actively avoiding them. For the third task, Get Alerts, the user will receive alerts to remind them to get back to work when their buddy decides that they have been distracted for too long. This also ties back to the "Feel Motivated to Work" task, where a pair of users function as peer supervisors to each other. The user could also receive an alert from the buddy when they have been working for too long; this could be a tool for preventing burnout. Lastly for the fourth task, Share Productivity Data, the user automatically shares data of the time they spent on apps and websites with their buddy, and they can compare their corresponding data with their buddy. This could also reinforce the "peer pressure" aspect of this design.

## **Design 2: Mobile Usage Schedule System**

### High-Level Idea:

This design focuses on how a user can track their mobile usage and receive alerts to improve their productivity. The user starts by having a short-term goal and linking his calendar (such as Google Calendar) to our mobile phone app. Based on the current calendar, the "Do Not Disturb" mode on the user's devices can be scheduled to be activated at certain times. The user may take a break by checking Facebook on their mobile phone. However, the user will get an alert to get back to studying and to remember about their short-term goal, as this motivates the user to accomplish the short-term goal. At the end of the day, the user gets feedback on app and site usage to which overlaps with their scheduled activities for that day. This allows the user to understand when they were distracted and what apps or sites distract them from doing their scheduled work.

## Sketches:



## How it Supports Our Tasks:

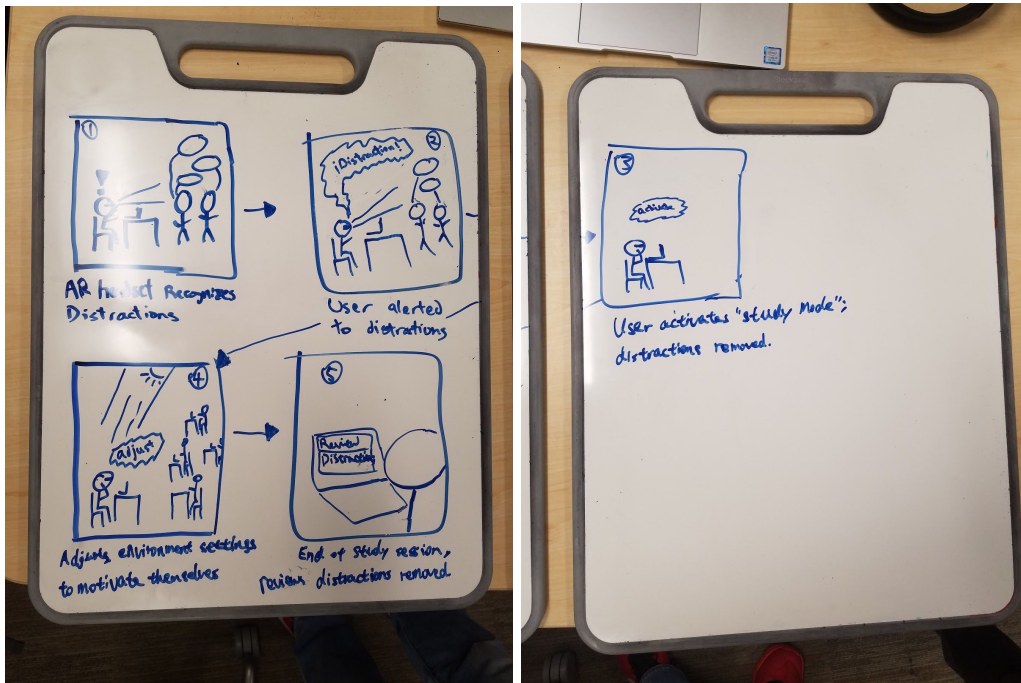
This design supports four tasks. For our first task, Feel Motivated to Work, the user will input a short-term goal. The user will receive a notification to accomplish their short-term goal when their schedule indicates they are suppose to start working or when it has been determined that they are distracted by non-work related apps and websites. The user will be motivated by their goal to be more focused on their study or work. For our second task, Understand How Media Impact Focus and Productivity, the user at the end of the day will be able to see how much time he or she spent on apps and websites shown in the day's timeline. The timeline shows the user's imported schedule, and the time the user was on other apps and site. The user will be able to see if their app and website usage interfered with their scheduled work. The user then will be able to understand how media impacted on their focus and productivity. For our third task, Get Alerts, the user will receive a notification to accomplish their short-term goal when their schedule indicates they are suppose to start working or when they are distracted by non-work related apps and websites. Lastly for our fourth task, Remove Distractions, the user removes distractions by having their phone set to "Do Not Disturb" mode automatically at certain times based on their calendar, as this is set for study or work sessions scheduled on their calendar.

## Design 3: Mixed Reality Work Environment

### High-level Idea:

This design aims to use MR technology to turn any location into a good working environment for the user. This design will augment the user's visual and auditory environment. It will track the user's interaction with the environment and alert them when they are distracted. The user will put on the MR device when they want to start studying. Then they will turn the device on and adjust settings to their liking, changing what they see and hear until they are able to focus well. If the user gets distracted, the design will alert them. This design will change what the user sees and hears in order to reduce or eliminate distractions.

## Sketches:



## How it Supports Our Tasks:

This design supports four tasks. For our first task, Feel Motivated to Work, users will be able to augment their environment in ways that help them feel motivated to work. This might include adding bookshelves around them, placing themselves in a virtual environment where people are studying, hearing sounds of nature, pages turning or other visual and audio study cues that help them focus and stay motivated. For our second task, Remove Distractions, the user can remove things that they see or hear that distract them from their current environment. The user can adjust the lighting, audio levels, filter out specific voices or all voices, remove background noise or add white noise, narrow the field of view, and blur out or block objects from view. For our third task, Understand How Physical Environment Impacts Focus and Productivity, the user will be able to view and understand data from their study sessions about their focus. To do this, our design will use eye and body tracking, and other physical cues to determine when the user is distracted and when they are focusing. With this data and data from the environment, our design can help the user analyze the kinds of distractions the impact their productivity the most. Lastly for our fourth task, Get Alerts, the user can set alert timer such that if they are distracted for a certain amount of time they will get alerts. Our design will then alert the user when they get distracted, when a short break goes too long, and when they're having a hard time focusing in the current environment.

## **Design and Tasks to Further Pursue:**

We chose our MR technology design that allows the user to turn any location into a good working environment. The reason we chose this design was that this type of design hasn't really been used before. It is unique, and seems interesting to implement. We also believed that this design would have the biggest impact on the users' focus, as it is changing what the user sees and hears around them. The tasks we chose to further pursue were to help the user feel motivated to work, and to remove distractions for them. We chose the first task because, in our research reviews, all of our participants stated that they work best when they are motivated to



work by outside factors. The reason we chose the second task was because it directly addresses the design problem we originally set out to solve; by removing distractions, we increase the users' focus on the task at hand. Our target user group is college students that have trouble focusing.

## **8. Written Scenarios**

### **Task 1: Feel Motivated to Work**

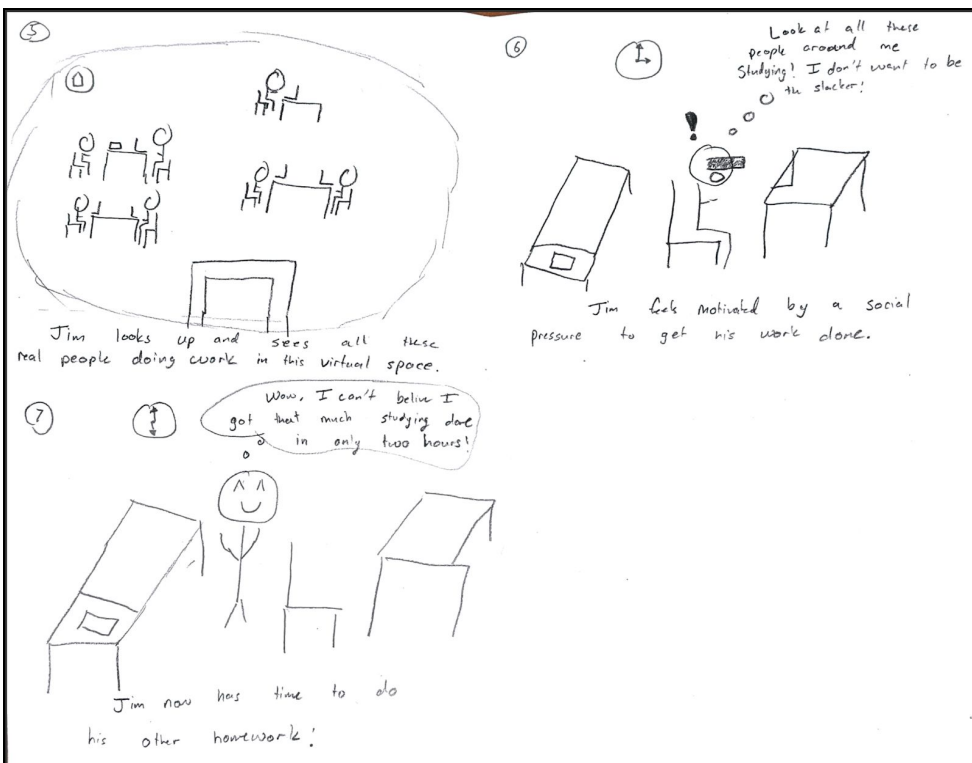
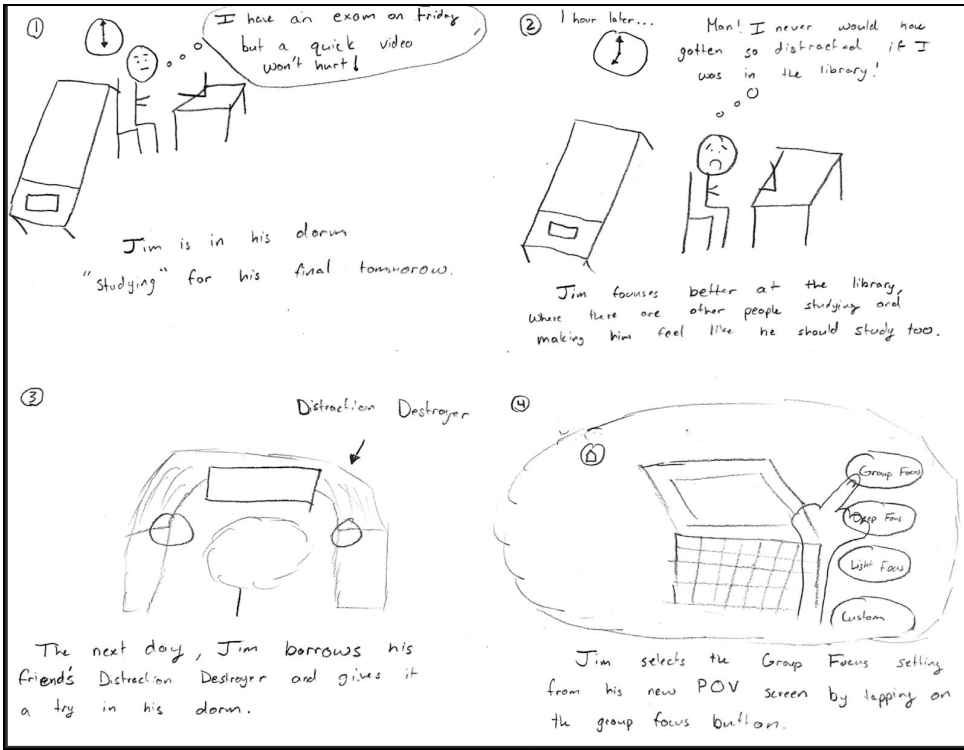
Jim is an undergraduate student at the University of Washington and he has an exam on the upcoming Friday night, and some other assignments due by the end of the weekend. Thursday at 6PM, he decides to start studying for the exam, but he thinks that watching a short YouTube video wouldn't hurt. However, he loses track of time and ends up watching videos for a whole hour. Jim is ashamed of himself. Jim feels like he would never have gotten distracted if he was in the library, because other people studying around would make him feel motivated to study too. The next morning, Jim borrows his friend's Distraction Destroyer (our Mixed Reality design, name pending), and puts on the AR device. Jim sees some buttons on the menu: group focus mode, deep focus mode, light focus mode, and custom. Jim chooses the group focus mode by clicking on it because he would like to study around other people. Jim then looks up and sees all these people doing work around him in the virtual study space. Jim feels motivated by social pressure to get his work done, and starts on it. Two hours later, Jim looks up and can't believe how much studying he's gotten done; if he got distracted like he normally does, it would have taken him 4 hours! Jim is happy and ready to work on his homework assignments.

### **Task 2: Remove Distractions**

Sam is an undergraduate student at the University of Washington trying to get some reading done. Since it's a bright, sunny day, he decides to do his work outside. Soon after he gets there, several children come out of a bus and start screaming and running around. Unluckily for him, it's Engineering Day at UW. The loud noise and motions in his peripheral vision make it difficult for him to focus. Fortunately, Sam has the latest version of the Distraction Destroyer (our Mixed Reality design, name pending). Sam fires the device up and puts it around his eyes. He sees some buttons that he can click on the menu: group focus mode, deep focus mode, light focus mode, and custom. Sam chooses the deep focus mode, and background noise is removed and background visuals are reduced. As he returns to his reading, he is able to give it his complete focus, as the noise and scene of children playing is completely gone.

# Storyboards of the Selected Design:

## Task 1: Feel motivated to work



## Task 2: Remove Distractions

