



Technology and Its Impact on Mental Health of Teenager's Mind

Phase 4: Final Report

CS 3724: Introduction to Human Computer Interaction

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Record of Changes

Version	Date	Comment	Name
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Introduction

Technology has an impact on everyone, whether it be positive or negative. Parents become reliant on technology for basic tasks such as getting their children to eat. They strengthen the link between their children and technology in this way, often without even realizing it. But this is just the beginning. Teenagers utilize and misuse technology once they have their own personal devices. Do they understand how technology affects them? Are they aware of how much time they devote to technology every day? What should the parents do to tackle this problem of addiction? Of course, all questions have answers, but they aren't always obvious or concise and they may differ depending on the context. Our group intended to find the answers/solutions to some of these questions/problems.

Group 23, Techno Interaction, intended to build a geolocation-based technology tracking system in the form of an app that restricts the use of technical gadgets depending on your location in order to promote more physical social engagement with school, friends, and family to reduce isolation. We took a number of steps, beginning with the implementation of an auto-turn off system, which automatically turns off entertainment platforms for individuals under the age of 21 after 11 p.m., promoting self-control and improving sleep patterns (which has a significant impact on children's daily performance and mental health). Secondly, we used location tagging, which allowed us to set up cellular or wifi blocks in specific places where signals will be dropped and phone service will be lost automatically. We integrated it into an app since it would be easy to access for everyone. On the app, users may create locked geo-zones and view screen time data for all users in the house. To address the issue of privacy, all data was handled and used on the device itself, ensuring the highest level of privacy and trust. Using the numerous HCI tools at our disposal, our team formulated a solution to this problem, which impacts millions of people throughout the world.

We used an iterative process - going through different phases, learning from our flaws and strengths. In Phase 1, our team used Contextual Inquiry (CI), Contextual Analysis (CA), design-informing model construction, and requirements extraction in order to tackle analysis. We conducted site visits, followed up with users and stakeholders and conducted thorough interviews and observations. Construction of design-informing models and creation of WAADs was also completed.

Our team took an interdisciplinary approach to human-computer interaction, incorporating human factors, cognitive, and phenomenological theories and models for Phase 1. To begin, we established the design issue space in which we were working. We chose the Unity Lounge in Whittemore Hall 530C as a physical workspace on campus. This was an excellent room created for such uses, allowing us to conduct interviews, team meetings, and other activities in comfort. We began scheduling interviews in order to collect data for the contextual inquiry. Each teammate conducted an interview with two or three people, asking them questions and transcribing their comments. We also gathered data through secondary research, such as websites that offered relevant information. Our team members studied the data, cited it, and

then took it into consideration. In the meantime, we were able to triangulate our understanding of the work domain and see how one method complemented the other through interviews and observations. Raw data from contextual inquiry obtained during observations and interviews was used to create WANs. Our WANs were created using Google Jamboard and sticky notes, with each note containing only one notion, idea, or fact summarized from the notes and other artifacts. We also looked for and deleted as much repetition as possible from the sticky notes. We began identifying, classifying, organizing, interpreting, and integrating the information we had. On Google Jamboard, we developed our WAAD by evaluating and ranking the several WANs, which were shuffled for variation. After that, we constructed personas with their own unique scenarios to aid in the development of our initial flow model.

James Corbin	Personality Traits
	• Introverted • Analytical • Loyal • Organized
Personal details	Characteristics
• Age: 15 • Work: Student • Gender: Male • Location: Austin, TX • Family: Younger sister, older brother	• Gets high grades in school • Life revolves around school, grades, social media, games • No clear long-term goals or aspirations • Checks phone for notifications frequently, which impacts focus • Unable to go more than 2-3 days without playing computer games • Does necessary work for school, but largely relies on technology for dopamine
Hobbies	Common uses of technology
• Playing computer games • Browsing social media • Guitar • Soccer	• Chatting on snapchat • Playing minecraft • Zoom for school • Interacting with friends on Instagram • Spends a lot of time on tiktok

Figure1: A persona of a potential teen and how he uses technology

Sophie O'Reilly	Personality Traits
	• Extroverted • Active • Charismatic
Personal details	Characteristics
• Age: 15 • Work: High School Student • Location: Chicago, IL • Family: Has two elder sisters	• Unsure about what she wants to pursue • Can't live without her phone • Spends most of her day on a technological device • Enjoys being active, but can't find a balance between digital and physical life
Hobbies	Common uses of technology
• Basketball • Hiking • Baking	• Spends time on TikTok as she has over 50,000 followers • Chatting with friends on multiple platforms • Doing homework • Watching TV shows

Figure2: A persona of a potential teen and how she uses technology

After everything was finished, the team gathered and communicated through walkthroughs. All of this information was examined using our WAAD to look for parallels, differences, limitations, and other factors. During this time, we also highlighted the major issues we encountered and the ideas we had. Finally, our findings and discoveries were meticulously documented.

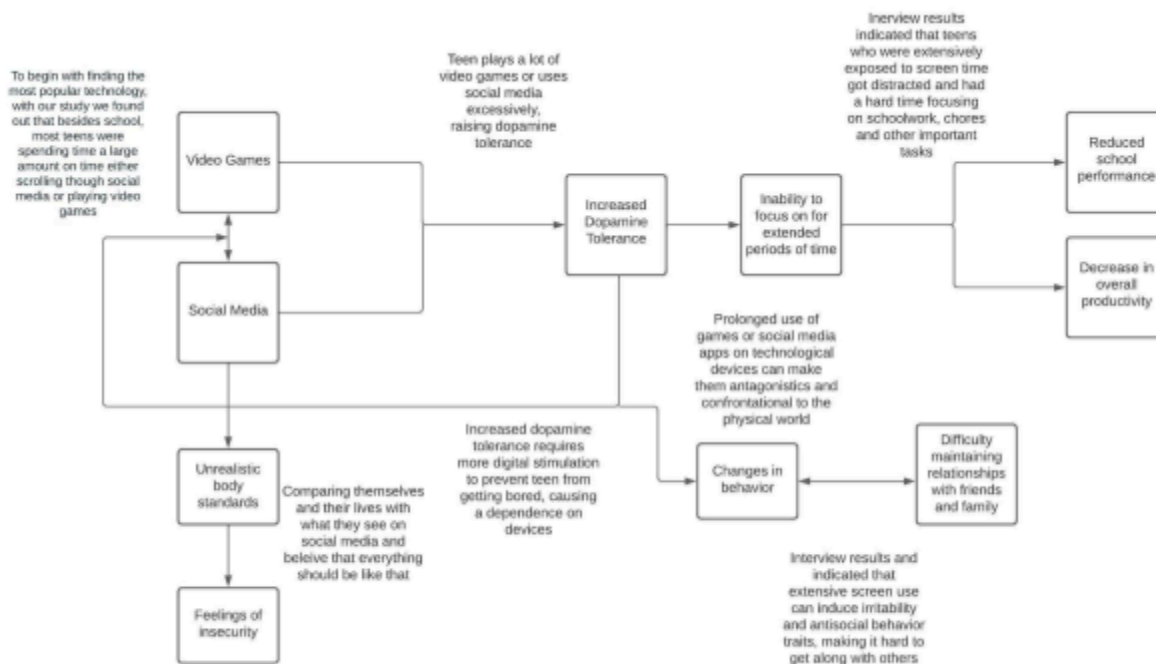


Figure3: A work flow diagram representing the information we collected

In the life cycle, the book, and this course, we emphasize the importance of design. For Phase 2, our group set out to tackle the design phase by generating personas and utilizing the resources of design thinking, ideation, sketching, conceptual design, storyboarding, and some basic design production to make this project as unique as possible and tackle the issue of "isolation."

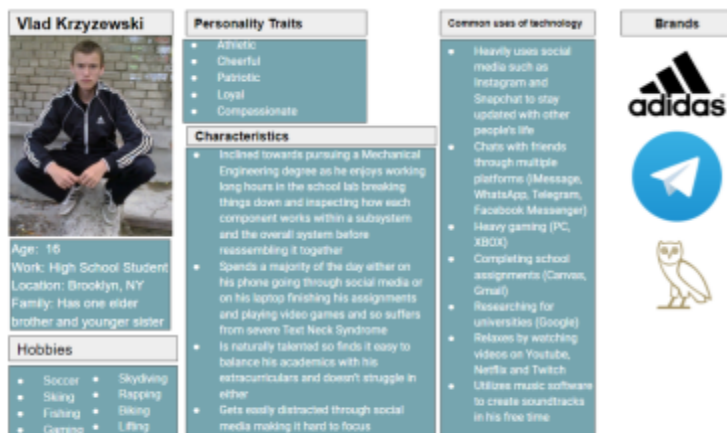


Figure4: Our primary persona of a potential teen and a detailed explanation on his uses of technology

Our group decided to think a little more about our system based on the criteria and observations after considering the feedback from the previous phase. We made certain that the

entire group reviewed and understood all technical issues, requirements, and limits. Our team also ensured that we not only observe to gather information, but we use that information to improve the clarity and precision of our design phase. We made a few minor tweaks and improvements in terms of user privacy and data protection, and we molded our system to fit the needs and observations. Our team divided up tasks according to strengths, weaknesses and interests. When it came to organizing ideation and criticism sessions, the team got together, everyone shared their ideas using tools like Google Jamboard, and then we analyzed all of the information we had. Data analysis was a high focus for us. Our group was determined to get the most out of these meetings. Following the evaluation, the team sat down to make important judgments, design requirements, and restrictions. Everyone would present their point of view, after which a rational and unified decision would be taken, ensuring an omnidirectional viewpoint that encompassed as many ideas as possible. Cross-functionality was accepted by our team. We got the idea that there should be no terrible ideas, so if you have one, put it on the jamboard. Our team followed the IDEO brainstorming rules to a tee, deferring judgment in favor of quantity. We also chose to confine each conversation to one person at a time and to be as visible as possible. Our peers expanded on each other's ideas, and we categorized and headlined all of our data. Finally, we encouraged wild ideas while remaining true to our theme. For the storyboards, we read through the textbook to learn how to create each sort of storyboard from an emotional, interactional, and ecological standpoint.



Figure5: This storyboard depicts Vlad entering the zone, where his entertainment apps are disabled until he goes home, helping him achieve good grades in school and enjoy his hobbies at the same time.



Figure 6: Prototype to create a restricted zone

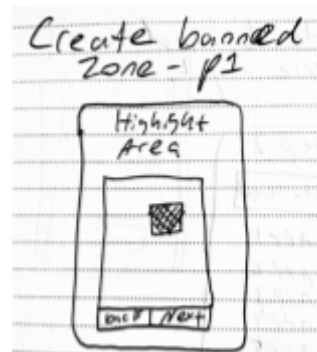


Figure7: Example Wireframes

We used the mockup design concepts as a starting point for the wireframe to generate viable designs. To create these prototypes, our crew used the balsamiq application. All of this data directed our actions, which yielded excellent results. We investigated how our system interacts with its surroundings. Our team noticed a shift from simply viewing the solution as a fixed product to viewing it as a service with a long-term journey. Our team concentrated on the interaction between our users and the system. We observed our design's emotional impact and value-sensitive components.

Prototyping is a process that allows us to test ideas before investing time and money. Our group adhered to the philosophy that the sooner you fail, the sooner you succeed. Our

group set out to complete the prototype phase by constructing and testing prototypes to make this task as intuitive as possible, armed with knowledge from our lectures and detailed feedback from Phase 2. Our group intended to provide sufficient justification for why we took the decisions we did in phase 3. We expected to develop prototypes and learn a lot more about our product/system by drawing on prior phases and missteps, as well as leveraging HCI tools to address unpredictability. At this point in the project, our design goal was simple: create an effectively scoped and working prototype so that we can analyze and learn more about our design before investing resources to build the real thing.

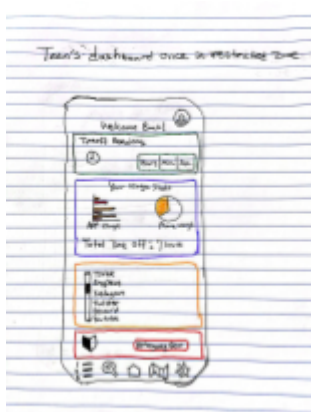


Figure8: Detailed mockup of restricted teen dashboard page

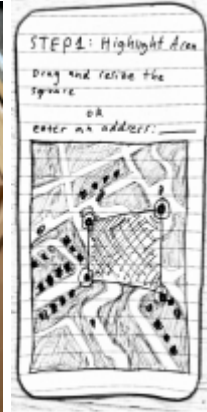


Figure9: Detailed mockup of the restriction zone setup page



Our team focused on two primary objectives when prototyping: designing a UX goal table and creating an appropriate prototype. Second, we devised an assessment that could be used to test and evaluate our prototype. We chose to scope our project in order to justify our decisions. Outside research was also used by our team to support our scope decisions. We decided on prototyping after determining our design research questions and taking into account the amount of time we had. We started by listing all of the questions we had about our design and then choosing a subset to use as the basis for our prototype. Our team also devised UX objectives for learnability, retention, and usability. Then we went over our design and the UX goals we had set. The results of our prototype and evaluation led to more design work, new targets, and different prototyping and evaluation rounds. We read through the textbook to learn how to make our final paper prototypes according to the heuristic assessment criteria and our prior prototype evaluations for the creative process, showcase, and walkthrough. We asked our roommates if they would be willing to participate in our study throughout the evening and answer certain questions for the pilot testing because it would be difficult to recruit many people to our worksite for an interview owing to time and compensation constraints. On top of the directions we had to offer, we estimated that it would take an hour to perform all six jobs.



Figure10: An initial sketch mockup of the login page



Figure11: An initial sketch mockup of the timeoff dashboard page



Figure12: An initial sketch mockup of the settings page

For our final prototype, we decided as a group to preserve the design's basic structure but tweak some elements to make it clearer, less confusing, and less wordy. We prioritized 'Match between the system and the real world,' 'Consistency and standards,' 'Recognition rather than recall,' 'Flexibility and efficiency of use,' and 'Help and documentation' on our product design using the lists of 10 heuristic assessment principles.

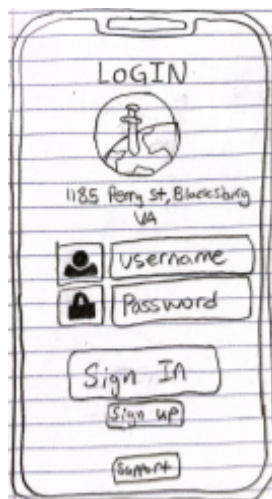


Figure13: Final prototype of the login page

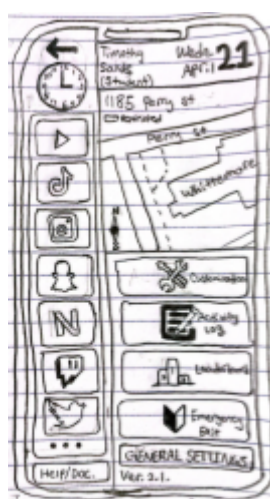


Figure14: Final Prototype of the dashboard from parent's view

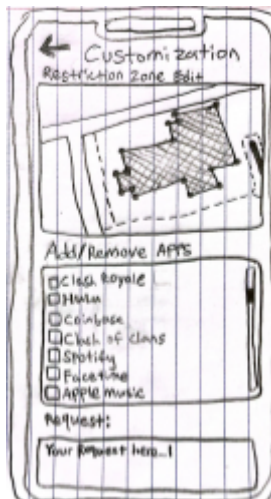


Figure15: Final prototype of the restriction zone setup

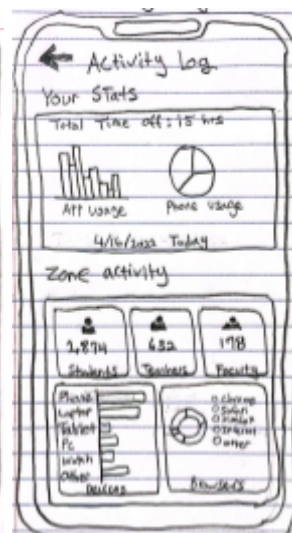


Figure16: Final prototype of the activity log

Due to the time limits imposed by the short turnaround time, we employed an analytical assessment to aid us with prototyping. It was significantly more practicable than an empirical evaluation. We leaned extensively on expert criticism and evaluations, since they imagined how our users would utilize the software. This was a type of heuristic evaluation in which 'evaluators employ proven heuristics (such as the Nielsen-Molich) to test the usability of user interfaces and provide specific insights that can help further improve the product usability...' according to the

company. To answer our research questions, we asked our evaluators straightforward questions about how they'd feel in certain settings if they knew about our approach to privacy protection. Our challenges were also designed to answer our UX-based study questions on configuring, changing, and navigating restricted zones. An effective review allowed us to focus on our UX goals of having zones that are simple to set up and alter, with clearly defined boundaries for users.

A few key research questions also arose for our group. The first was the issue of privacy. How might we maintain our functioning while protecting the privacy of our users' personal information? This point was critical for our data; privacy is important in today's world, especially for an app that contains sensitive information such as you and your family's location data, phone data, and other personal information. Rather than getting the data via our server, we retrieved the location and did the location-based calculations locally on the teen's phone. The second question we had was how can we best assist parents in blocking distracting apps that they may not be familiar with? To further address this issue, we decided to include a button in our prototype that automatically bans all games and entertainment apps based on their app store information. This dedicated killswitch button was added to our prototype to learn more about how users react to it. Finally, we had another concern: how can we effectively explain the exact boundaries of prohibited zones in a way that is comparable to your current location? In order to address this issue, we explored overlaying the restricted zone's borders onto a map and showing the user's current location as a node on that map in our prototype. In order to get feedback and make our prototype more understandable, we used an example of this. This way, we tried to figure out how to determine how to decide the UX process in the real world, and this specific prototyping phase in particular, best fits our project, by using prototyping and assessment, as well as the many resources available to us. We also tried to justify our choices in order to provide better clarity.

For Phase 4, we went ahead and evaluated all our work which we did for previous phases. We will discuss the results of the evaluation. Our team will also bring diverse viewpoints on the items we learnt during the review process together and resolve them. Our report will go into great detail about the logistics of conducting our evaluation, the number of people who participated, the tools used for prototype delivery, the content and approximate duration of time for each phase, as well as events of interest that are not related to the measured results. Our team will additionally incorporate Data Representation of Key Results in Phase 4 - replies to questions, survey results, walkthrough observations, and/or other evaluation input. Our appendix will contain all of the obtained data. With the use of images from our evaluation session, our team intends to synthesize major findings, then analyze and evaluate them.

Overall, we plan to present a final write-up for our semester project based on the outcomes of our design's analytical examination and our team's predictions for the project's future paths. Our group intends to do so by following a typical research paper format. This final phase report will be comprehensive. Even someone who is unfamiliar with our project will be able to read this report and comprehend our system as well as the work we have completed thus far.

Our document will present:

- Methods - Built from Phase 3 evaluation plan with only minimal revisions. Will also note where, as a consequence of TA input or pilot testing, we revised our evaluation approach. Will also contain enough information to allow someone to recreate our evaluation.
- Results - Will include evaluation logistics, such as the number of participants, the tools, prototypes utilized, and the length of the various phases. Will include representative data from major results, as well as visuals if necessary. Where applicable, an overall summary and links to appendices will be included.
- Analysis - Written information outlining our team's interpretation of the data and how it relates to the design questions. This will include a cost importance analysis table as well as detailed information and reasons for the table. There will also be a summary table of UX goals and written details.
- Discussion - Future design ideas are discussed, as well as which sections of The Wheel our group would need to revisit and why. To justify design directions, this section will link back to the analytical section as well as previous phases. It includes a discussion on future evaluations based on this evaluation's experience, as well as a conclusion linking the group effort to the course's larger context.
- Appendix - Raw notes, photos, tables, questionnaires, and other materials from the evaluation are given here for perusal. Any completed forms returned from evaluators, such as survey responses, heuristic violation reports, and so on, are also included.

Methods

If we were to do this again in the future, we would like to have a rapid and analytical approach. To get the best insights of our prototype and product, we need to evaluate our interface through the lens of our intended demographic. Doing so would allow us to observe the effects of specific interfaces on different users. This would ultimately help us in differentiating between desirable and undesirable features for future iterations. Not only this, but we would be able to assess the extent of our system's functionality and identify specific problems. Since usability and user experience are not directly measurable, our evaluation will focus on indicators of usability and UX that can be observed. Rapid evaluation will be useful when we want faster results, by using less expensive methods, provided of course that it is acceptable to trade off time in order to maximize effectiveness. Our team would also take into consideration - the timeframe, budget, project stage, and goals when evaluating. Using an analytic approach would also be preferred since it relies on expert evaluation of a design in terms of its inherent qualities, as opposed to its actual use in context. We would also want to use proper data collection techniques and have thorough notes - necessary for critical information. All heuristic evaluations, benchmark tasks, forms, scripts, and other materials that are necessary to conduct our evaluation is provided in the appendix H.

Procedure

Each participant will be given a questionnaire that will contain a few multiple choice questions and a plethora of short answer based questions which are solely aimed at encouraging the evaluator to actively think about our prototype and provide thoughtful feedback and reflections. Furthermore, they will be given a separate document containing all the heuristics that our product is centered around. The questionnaire is designed in a manner such that the evaluator will be asked to perform a variety of tasks of ranging complexity levels as a way for us to check that there are no edge cases which fail. After the questionnaire, there will be a brief Q&A session between the evaluator and the team for any questions that they might have regarding our product. Additionally, based on our second pilot test from Phase 3, where one of our testers was having difficulty understanding the information flow of the system we thought it'd be beneficial to replace our previous task 3, *"Go to the restricted zone covering your house, and resize the zone to include your neighbor's house"*, with a more descriptive, thorough, and insightful task by asking our testers to modify a restricted zone through the zone modification tools provided in the zone management screen.

Before starting the evaluation process, our team will give a full rundown on the purpose of our product, how the system works, and our intended demographic so that they can imagine themselves as our target persona when answering certain questions. The evaluators will be asked to complete the following tasks:

Task 1: Create a restricted zone covering your house, and ban all game apps.

Task 2: (in a restricted zone) leave the restricted zone to be able to have full phone access

Task 3: Modify the restricted zone to incorporate a larger area through the zone modification tools

Task 4: Find the app the teen spends the most time on

Task 5: Modify the permissions to the restricted zone to un-ban one game app

Task 6: Delete the previously created restricted zone

Materials

There will be 13 documents that the participants will interact with during their evaluation process. The documents are broken down as follows:

- Questionnaire
- Heuristic Document
- Paper cutouts of Wireframe

Each participant will be handed the questionnaire alongside the heuristics document for the entirety of the evaluation. It is expected for them to write all their responses on the questionnaire response section. The heuristics sheet will aid them in keeping track of whether our prototype meets the heuristics that we claim to have centered our product on. Although we will have given a brief overview of our target personas, we will have a section which gives a description of each one for questions pertaining to how our personas would react. On top of this, the team will be utilizing the Interviewer Form to document timings and notes regarding the participants.



Figure17: A picture of how we had our interviews setup

This is an example of our setup where we interviewed our evaluators. As you can see the table should not have any other material except the questionnaire sheet, heuristics sheet, and a set of the low fidelity prototypes.

Prior Connections

In phase 2, we tailored our various personas in such a way that they collectively approximated the average teen student with regards to phone habits. Furthermore, in phase 3 when we showed our prototypes to the testers, we noted the many ways that our preconceived personals translated to the personalities and behaviors of people in the real world, namely our friends and roommates.

For example, when we showed them our prototypes, the first positive feedback we received was the positive implications of not having access to distracting apps during environments that necessitated focus. Many teenagers knew that, for example, using a social media app like Snapchat in class would distract their ability to focus on the material. In spite of this, they continued to use it anyway. Our ability to block the app hampered their “ghost finger”, which they remarked would be useful in class.

The prototype in conjunction with the copious amounts of feedback we got from our evaluations helped us answer the initial questions that we set out to answer through the use of our research design questions. We realized that there is still work to be done in order to create the app we originally had designed when thinking about isolation and how we can tackle teenage dependency on technology, but the positive evaluations certainly bolstered our confidence in the product thus far.

While working with our partner group, most members of both groups were on Microsoft Teams. However, there was a small minority from both groups that were in person that day so they met in person while joining the call as well. The other group's prototype was hosted on a website, so it turned out to be very practical for us when evaluating. We had a low-fidelity prototype (designed on paper) which we took pictures of and displayed on a document for the other team's evaluators to go through. Considering that Pradyuman and Tony expressed an interest in becoming researchers when conducting interviews, Aydin and Avi subsequently became evaluators.

Results

Evaluation Logistics

Four people have participated in evaluating our final prototype. During our initial phase of showcasing our prototype, we asked 2 of our roommates to perform pilot tests of our prototypes to get as much preliminary evidence on the effectiveness of the current design flow and the feasibility alongside usability of our prototype through the perspective of our test users. We observed potential users' interaction, what errors they made, got feedback and evaluated their satisfaction rating. From the figure 1, although the participants breezed through each task easily and so their performance was higher than the expected target levels, he had a plethora of

thought-provoking questions within the privacy and child safety realm of our product which definitely led to us having a debate on how we can reiterate the product for the next round to help address these concerns. Based on this, we certified that all user data is safeguarded locally and is not sent to a server. From the figure 2, the participant had a lot of trouble trying to figure out how to modify the zone. This was because of the flaw in our designs since there were two separate ways of creating the zone. Having two ways to access what is essentially the same part of the app confused our tester, revealing insights into some deficits within our design. Everything went smoothly except on tasks involving modification of existing zones, the overall performance was worse than our expected target levels.

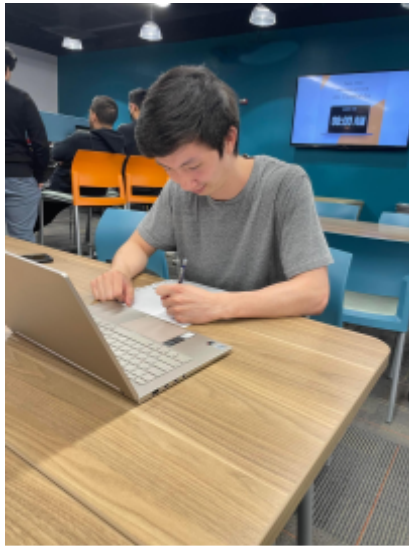


Figure 18 : An image of our participant completing the questionnaire



Figure 19 : Participant visualizing how the app would feel through our paper prototype

Next, during the phase 12B activities, we used our paper prototypes to showcase our product via online Teams meeting. We provided detailed screens of the final prototype on word documents and it resulted in approximately 50 minutes of observing participants utilizing our product and getting feedback. We encountered an issue at one point because we required more paper prototypes if the other team were to actually give us proper step-by-step feedback on our system. We were able to make 6 additional paper prototypes to help fill the blanks on certain app features for presentation. Since we had to perform this evaluation late at night around 11pm, it caused constraints in everyone's availability. Since the participants were not able to give proper feedback in their best condition and because we had a paper prototype, participants had a hard time distinguishing between buttons and the displays. These factors might have influenced our group's ability to accurately collect the data [Appendix G].

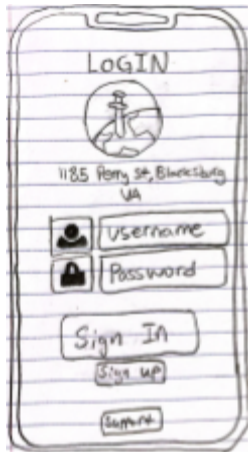


Figure 20: Final prototype of the login page

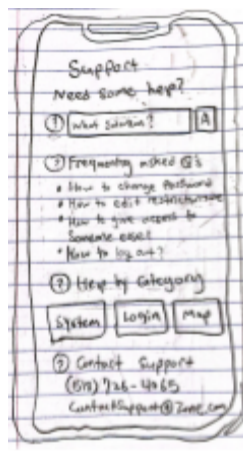


Figure 21: Design of the support page



Figure 23: Final Prototype of the dashboard from parent's view

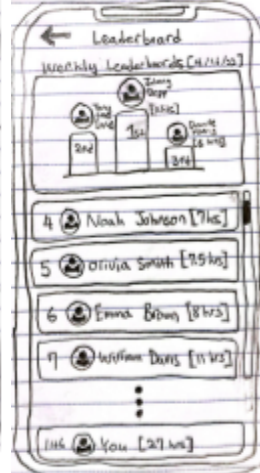


Figure 24: Final prototype of the leaderboard page

Data Representation of Key Results

From our pilot test, the results of the first pilot test confirmed our group's original vision of the study as the participant managed to finish the questionnaire within the time limit—50 minutes—and the time spent per question (overall pace) was a bit quicker than what we had anticipated while planning the test. Everything went smoothly except on tasks involving modification of existing zones, which took 14 minutes longer than expected.

The participants, Nick Bloom and Satwik Tadikamalla, walked through our paper prototype to show how they would interact with our product and gave us feedback on the system during activity 12B. We asked Nick to walk through the prototype from start to finish. He described that the app was simple and straightforward in design that new users can navigate through intuitively since it had a similar format to some of the common commercialized apps. He described that the only thing we should keep in mind is that he found the main dashboard screen a bit clustered with all its buttons and to differentiate the design so that the app is not too similar to an app called Net Nanny. Satwik was given specific tasks for him to complete. The tasks were to: sign-in and get to the main dashboard assuming that you are a new user, edit the restriction zone starting from the dashboard, log out of the account from the dashboard, and lastly, navigate to the support page. He successfully completed each of its tasks within the 1 minute time frame. He described that he liked the dashboard design and it did not feel clustered. He also found the list of disabled apps on the dashboard useful. We asked him what he thought of the Activity log and the Leaderboards. He described that he found both menus useful since Activity log helps the user grasp an idea of how other users interact with the system, and the leaderboards provided an incentive for kids to be motivated and stay engaged [Appendix F].

Summary of Key results

Based on these findings, we note that participants had the most trouble navigating features which pertain to the modification and deletion of existing restricted zones. Participants liked our overall design of the prototype since it was simple and intuitive as long as users had previous experience with phone apps. One participant thought our main dashboard screen was a bit clustered but the other participant thought that it was perfect since it provided necessary information where users don't have to practice recall. We believe that with minor changes to our design that takes into consideration some additional 10 heuristic evaluation principles such as: Flexibility and efficiency of use, and the Match between system and the real world will aid in making a better user experience.

Analysis

In order to assess the effectiveness and quality of our product, we looked at how our research design questions that are mentioned in the introduction aligned with the findings uncovered from the previous section. In regards to privacy, we noticed that many users didn't realize that all their data was being stored and processed locally rather than through a server. This shined light on critical issues that we realized: given the vast amounts of data collection nowadays, user's automatically assume that they're data is being exploited and that they were oblivious that we aren't storing any of the data as that would be a privacy issue. Our next research design question tackled the issue of automation and accessibility for parents. Many users showed great interest in the way we decrease the overall time parents are spending on our app trying to figure out which apps to block using the killswitch. This further bolstered and solidified our initial thought of creating an easy-to-use product. Our last research design question was allowing users to determine their location relative to boundaries of prohibited zones and based on the feedback we received it seems that the map is not very responsive and that users struggle with figuring out their exact location. This could possibly be due to the fact that when indoors, it is harder to determine a phone's location locally compared to being outside.

When analyzing the findings, we further concluded that our participants enjoyed our overall design interface as it was simple and intuitive, but struggled with customizing an existing restricted zone feature since the data flow and interface design is convoluted and complicated, so that is an issue that needs to be fixed immediately. In addition to that, our dashboard was an area of concern in regards to the amount of information being displayed. This could perhaps distract users from their intended task or perhaps even confuse them due to the number of variables at hand. Therefore, to address this, we decided to revisit the drawing board and recreate a more simplistic, modern interface which is less cluttered but still offers the same level of information, interactivity, and functionality.

Summary Table/Connection to UX Target Table

We had 10 user classes varying from casual/heavy personal use teenagers, casual/heavy school use teenagers, parents, parents who have casual teenage users, parents who have heavy teenage users, and finally the faculties. Our baseline and the target level depended on the UX measures of different qualitative satisfaction levels such as initial user performance, and first impression. We recorded relevant expert feedback provided to address the goal on the observed results section below and we came up with a conclusion on how we would utilize these feedbacks to further improve our design.

Work role: User Class	UX Goal	UX Measure	Measuring Instrument	UX Metric	Baseline Level	Target level	Observed results
Teenager: Casual user, for personal use	Initial clarity of feature	Initial user performance	Exiting a restricted zone using UI	Average rating across users and across questions	6.5/10	8/10	User was able to swiftly exit the restricted zone as they found the interface intuitive and self-explanatory
Teenager: Casual user, for school use	Initial customer satisfaction	Increase in quality of education	Gradebook	Analysis of grades from exams	10% increase in grades	25% increase in grades	The user agrees that the app helped to slowly get rid of the 'invisible finger' which prompted them to check their phone every few minutes or so.
Teenager: Heavy user, for personal use	Initial clarity of feature	Initial user performance	Questions Q1-Q10 in questionnaire XYZ	Average rating across users and across questions	6.5/10	8/10	The user severely struggled while in an active restricted zone given their heavy use of social media and gaming apps. They couldn't figure out how to exit an active restricted zone, find their relative location, or even check how much time is left on their TimeOut. There isn't enough documentation to

							help certain users in terms of navigating their way through the app.
Teenager: Heavy user, for school use	Initial customer satisfaction	Increase in quality of education	Questions Q1-Q10 in questionnaire XYZ	Average rating across users and across questions	10% grade increase	25% grade increase	User time spend procrastinating decreased by 18%
Parent of a teenager	Ease of use for new user	Initial user performance	Ability to set up restricted zones	Time spent on task	1.5 minutes	30 seconds	The parent enjoyed the card on the dashboard which allowed for a quick deployment of a restricted zone.
Parent of a teenager	Initial customer satisfaction	Improvements in teen's quality of education	Gradebook	Analysis of grades from exams	10% grade increase	25% grade increase	The parents were satisfied with seeing their child spending more time on school-related work. Want to expand the restriction zone to more areas but struggle to do so.
Parent of a teenager: who is a casual user	Positive emotional impact	Teen's attitude towards app	Questions Q16-Q25 in questionnaire XYZ	Average rating across users and across questions	7.5/10	9/10	The parent feels that the leaderboard encourages their child to compete with others to remain offline for the most time. However, they feel that there should be more data and associated visualizations shown on that page.
Parent of a teenager	Initial customer satisfaction	First impression	Questions Q16-Q25	Average rating across	7.5/10	9/10	The parent has set up multiple restricted zones and can select

er: who is a heavy user	n	on	5 in question naire XYZ	users and across questio ns			them through the drop down menu on the dashboard to quickly deploy a zone and so thoroughly enjoys the practicality offered.
School faculty: admins	Performan ce increase exhibited by students	First Impr essi on	Questio ns Q26-Q3 0 in question naire XYZ	Averag e rating across users and across questio ns	8/10	9/10	School admins appreciate that the killswitch can easily block all distracting apps. The only issue they struggle with is editing the restricted zone to either expand or shrink it.
School faculty: teache r/profe ssor	Perceived value given restricted access to phones	Eas e carr ying out work role	Questio ns Q26-Q3 0 in question naire XYZ	Averag e rating across users and across questio ns	8/10	9/10	The staff noted that without the disturbance of phone notifications, the students were able to perform better.

Table 1: Target table that showcases our UI goals

Cost-Importance Analysis Table

Based on the pilot tests and feedback, we were able to boil down the most important issues that our app's interface currently faces. The best way to plan on how to deal with these issues is using a cost-importance analysis table. Recognizing the fact that having a cluttered dashboard and unclear distinction between the two modes available were critical issues and so they were given the importance of *M* while every other matter wasn't that significant to be addressed immediately. What further helped us to categorize the tasks was segregating them based on the importance of that issue in relation to the app running smoothly, overall cost to implement, and how easily the solution could be implemented. The resulting table shown below is the outcome of that.

Problem	Imp.	Solution	Cost	Prio. Ratio	Cuml. Cost	Resolution
The main dashboard screen	M	Redesign dashboard	2	M	2	Fix now

is cluttered		with simplicity as main aim				
There is an unclear distinction between the two modes- teen vs. parent- on the app	M	Different design interface for each mode	1	M	3	Fix now
Users would, in some cases, prefer to search by address rather than scrolling on the map.	4	Implement a feature which lets users search location by address.	3	4000	6	Fix now
Teenage users had difficulties finding where they were located on the map in real time	3	Add a reset view button	3	3000	9	Fix, time permitting
Some users found traversing through the different menus difficult.	3	Make the different facets of the application simple, concise and try to reduce them to a minimum	3	1500	12	Fix, time permitting,
Poor documentation within the app meant that full capabilities weren't realized and users were often confused	2	Add a F.A.Q and more detailed guides on how to use the app	1	2000	13	Table until next version

Table 2: CIA table that showcases our problems and how we will deal with them

Discussion

Future Design

After going through the first round of the wheel and with the current state of the project based on the feedback and other issues we've realized, we feel it is best to go back to the design phase and continue refining the overall design of our app in order to make it more simple, easy-to-use, and less convoluted than it is right now. We would completely redesign the dashboard so that users would instantly recognize the full capabilities that our app provides through more informative, interactive visuals as that is a current problem that they face. Not only this, but we would also streamline the zone creation, modification, and deletion through one page rather than having multiple pages that do so. We would also simplify the dashboard by removing all the clutter into specific tabs and enforcing a simple interface. The concerns raised by our users are ones that we feel we should have predicted and fixed accordingly in retrospect, and so by implementing them we would definitely allow our app to further progress to becoming what we had originally envisioned. Only after we have met these criteria would we move into the prototyping phase where we would need to collect data from our users to see how well they respond to the new iterations we added through a more comprehensive, thorough evaluation plan. This redesign would certainly help our product in the long run as it would reduce user frustration and in turn improve the overall user experience.

From the CIA table:

The dashboard wireframes in Phase 3 must be redesigned, optimizing for simplicity and being easier to read. Currently, there is too much going on there: map, date and time, a column of banned apps, the leaderboard, request access button, customization, and so on. Our solution to this will be to spread out the contents a little more, increasing the number/height of screens, thereby making them easier to digest. Following the redesign, we will validate that our design was improved by doing a new analysis and comparing the results of the new dashboard to those of the previous one. This will be our first formal iteration on an existing prototype.

The second highest priority fix is building greater awareness of the distinction between parent mode vs. teen mode. The app is intended for use by two stakeholders: parents and teens. The app has separate modes for each user class, but the frontend design is very similar in both cases. This caused confusion among our testers, who were unaware of the distinction until we explained it expressly. Our approach to solving this will be to include a clear form on the login screen, asking the user if they are a **parent**, or a **teen**. It will be impossible to sign up without selecting one option, thereby removing ambiguity surrounding the similarity between the interface for the two user classes. After we implement the new design, we can test the validity of our solution by asking testers to sign up explicitly as students, or as parents. If this can be accomplished smoothly without any critical incidents, then our design is successful.

The next solution is both easy to implement and would have a big impact on the usability of the app. When one user wanted to set a restricted zone very far away from their current

location, we realized that they would have to spend potentially several hours scrolling over the map to get there. To solve this, we will implement a text field which enables the user to search by address and directly have the map view jump there without any scrolling. This will also be helpful in situations where the user wants to ban a location they don't know the address of, but they know of a nearby landmark. In this edge case, they will be able to jump over to, and scroll over from there. We can test that this improves our design by asking a tester to, provided an address, create a ban zone over a specific school in another state, such as California. Successful completion of this task would necessitate the use of our search-by-address feature, validating the need for such a tool.

The next issue, also location-based, involves the user having difficulty self-locating on the map. The source of this issue is that we do not localize the user in the map view, because we wanted them to be able to scroll around and view restricted zones in areas potentially far from their current location. In order to retain this aspect of the map and incorporate self-localization, we can implement a "reset view" button into the map which automatically pulls their location into the center of the map screen, indicated by a bubble icon above their location. Testing this feature would involve asking the user to scroll the map to find a school or restaurant outside of their location, then asking them to bring the map view back onto their location. If they begin scrolling back, the design is ineffective and needs further improvement. If they immediately click the "reset view" button, then the design is effective.

Our app has many different menus- apps, leaderboard, dashboard, etc. We simply have too many. Solving this is not as straightforward as the above problems, and would require exploring different possibilities for views and navigation. One approach may be to replace the app menu with a separate page, which just has a list of apps and a search bar. All the apps would be displayed by default, and the user could start typing into the search bar, which would eliminate apps whose names do not include the searched content. To compare our redesign to our current design, we would define a task which involves heavy use of the menus in the current design. An example may be navigating to the leaderboard and checking the 14th highest scorer for the whole week. If the user can accomplish this task faster in the new design than the old design, then the new design is better.

Lastly, we need to make sure to get the full extent of our feature across to the users. Games do a great job of this: they have many features, so when a game is loading, they display a tip or introduce a lesser-known feature in one to two sentences. This is very helpful to gamers, and we can imitate this in our own app. Although app loading times tend to be too fast to display readable content during that period, we could reserve a small section in the login screen for a small tip or explanation of a feature, which would provide useful information about how to use the app. Secondly, including a documentation page would be necessary for those interested in delving deeper into the app. This type of person would be willing to read through a more detailed guide covering all the features, giving a more comprehensive overview of the entire tool. To evaluate this improvement, we could let testers use the redesign and the old design for 2-5 days. After the testing period, we could ask both users to complete the same task involving those lesser-known features. If those using the new design are faster, and have less critical incidents (if any) compared to those using the old design, then the new iteration is successful.

Future Evaluation

For our future design changes, we would like to incorporate different evaluation procedures to improve short-term analysis, redesign, and testing as well as long-term visions for the product. For the short-term analysis, we had utilized rapid evaluation via Teams meeting to get feedback on our paper prototype. Since evaluators had to hypothetically walk through the use of our product on a paper prototype, it was hard to get proper feedback on what works and what doesn't. In the future, we could make a real prototype on Figma so that we can show the participants what it would look like in real time, how each button would function, and if the system causes any error. This would be critical in further improving our testing to get more accurate results. Considering our long-term vision, instead of relying on rapid evaluation results from two participants, we would like to use questionnaire programs such as Qualtrics or Google survey to get data from multiple people. We would ask questions such as what did you not like about the product? What did you like about the product? On a scale of 1 to 5, was it easy to use? What is your overall satisfaction rating? What would you do to improve the product? This would aid in providing us with more accurate feedback for the redesign.

Conclusion

Starting from scratch with no ideas in mind of how we will proceed to make a design that can help users who suffer from isolation especially from the recent event of a COVID-19 pandemic, to brainstorming potential ideas based on various people's problems, wants, and needs. Drawing up potential designs, making a prototype and evaluating our product, we learned that our design is now something that can be commercialized where people will be able to limit their addiction to technology use. It was interesting to utilize the wheel of user experience design principles such as research, design, prototype, and evaluation in making a practical design.

For the design in general, we realize that no matter how good of a design a product may have, it won't be considered a good design if nobody will utilize it. It would be critical that we consider all design principles to make a great user experience, work with professionals in different fields to grasp what users really want and need, and have a marketing value for the product to be considered a successful design.

We found a passion in HCI/UX learning different design principles and how it affects user experience. As a UX designer, UX researcher, UI designer, and a human factors researcher in the future, we can utilize what we learned in class such as how to properly conduct research on a problem, how to work in a cross functional team, how to better work in a hybrid/remote work environment, and how to write a technical report.

We could utilize these principles to make a product that can make users satisfied with their interaction with the design.

References

Akram, Waseem, and Rekesh Kumar. "A study on positive and negative effects of social media on society." *International Journal of Computer Sciences and Engineering* 5, no. 10 (2017): 351-354.

Charoensukmongkol, Peerayuth. "The impact of social media on social comparison and envy in teenagers: The moderating role of the parent comparing children and in-group competition among friends." *Journal of Child and Family Studies* 27, no. 1 (2018): 69-79.

O'Keeffe, Gwenn Schurgin, and Kathleen Clarke-Pearson. "The impact of social media on children, adolescents, and families." *Pediatrics* 127, no. 4 (2011): 800-804.

Royant-Parola, S., V. Londe, S. Tréhout, and S. Hartley. "The use of social media modifies teenagers' sleep-related behavior." *L'encephale* 44, no. 4 (2017): 321-328.

Drouin, Michelle, Brandon T. McDaniel, Jessica Pater, and Tammy Toscos. "How parents and their children used social media and technology at the beginning of the COVID-19 pandemic and associations with anxiety." *Cyberpsychology, Behavior, and Social Networking* 23, no. 11 (2020): 727-736.

Wright, Michelle F., and Sebastian Wachs. "Moderation of Technology Use in the Association Between Self-Isolation During COVID-19 Pandemic and Adolescents' Romantic Relationship Quality." *Cyberpsychology, Behavior, and Social Networking* 24, no. 7 (2021): 493-498.

Drah, Hermina. "30 Surprising Cell Phone Addiction Statistics for 2021." DisturbMeNot!, February 1, 2021. <https://disturbmenot.co/cell-phone-addiction-statistics/#:~:text=According%20to%20a%20Pew%20Research,by%20two%2Dthirds%20of%20parents.>

"What Is Heuristic Evaluation?" *The Interaction Design Foundation*, <https://www.interaction-design.org/literature/topics/heuristic-evaluation#:~:text=Heuristic%20evaluation%20is%20a%20process,usability%20from%20early%20in%20development.>

Appendix A

Observation 1

When interviewing one of our interviewees, we noticed that they were acting closed and reserved at the start. As the interview went on, they gradually got more comfortable and open about their experiences with their younger siblings and technology. Their poise continued to remain relaxed until we asked one question pertaining to social media and its influence on enforcing a certain body-image, and they seemed immediately taken aback by the question. After recovering, they answered that yes, indeed, their sibling had problems with social media and self-image. For the entire remainder of the interview, the interviewee returned to being reserved as they had been at the start of the interview. Based on their reaction after having been caught off guard, it became apparent that this was an issue our interviewee took very personally, and that they were genuinely upset that their sibling had a body-image problem with social media. This provided us with striking insights into the psychology of a teen sibling relationship, and how a sibling who really cares for their younger brother or sister may share genuine emotional pain over damage wrought upon that sibling by social media.

Observation 2

When interviewing Dalia, a team member observed that she frequently used the word “again” when describing her brother’s actions in response to extended screen times. She explained how her brother would get jumpy and irritable, and the manner of her explanation made it apparent that it wasn’t an infrequent occurrence. It was clear that her brother would be regularly exposed to extended periods of screen time, causing ups and downs in his mood at least multiple times per month.

Observation 3

During our interview with Andreas, we observed that when asking whether or not social media impacted his brother in ways that would affect his self-image or induce insecurity, he had a chuckle before answering that it was not the case. Based on his reaction to the question, it was clear that technology affecting his personality was no concern at all, enough that the question was genuinely unexpected and humorous to consider. It can be concluded that his brother’s personality is very robust against social media.

Observation 4

An important detail our team picked up on is that every time an interviewee reported that their sibling regularly spent very long periods of time on screen, they said so distastefully and with a negative connotation. Although rarely mentioned explicitly, it is evident that extensive use of gadgets at a young age is globally viewed as a negative trait, and something which should be prevented. The extent to which high screen usage affects teens is hard to quantify, but we observed a clear correlation between the level of harm a teen experiences from screen time and the number of hours per week they reportedly spend on gadgets.

Appendix B

Interview 1

Abby L, Senior, Biomed Eng.

Date: February , 2022

Reason for Interview: Obtain perspective from a college student who has a sophomore brother (15) in middle school.

In this interview, we had a senior college student describe what she thinks the effect of social media has on her younger brother who's currently in middle school. She described that her brother spends more than a third of his day using technology like smartphones, computers, and xbox. He is so obsessed with technology that he decides to text the family rather than go downstairs to communicate since it's 'easier', and spends all his weekend playing video games with his friends rather than going outside. She believes that technology is developing at a rapid speed and because of it, the normal way of lifestyle is changing at a similar rate. It's hard to judge if it's okay or not since they are on the same page as their peers but there should be a limit on what young kids can do on their devices to help them realize it is not okay to rely so heavily on technology. Also she mentioned the negative impact of social media since they often show exclusive contents to those under 18 years old and the extreme uses of porn. She thinks social media had a positive impact helping people stay connected during the isolation period of COVID-19 but it definitely hurts their mental health in a direct and indirect way.

Interview 2

Daunte H, Junior, EIT.

Date: February, 2022

Reason for Interview: Obtain perspective from a college student who has a younger sister in middle school

In this interview, we had a junior college student describe what he thinks the effect of heavy technology uses has on her younger sister who's currently in middle school. We noticed that even 12 year olds have issues with technology obsession. Although they are too young to be on a social media platform, they can encounter such platforms accidentally. She spends around 6 hours a day on her iPad and Nintendo switch. He stated that the parents give her the technology whenever she's done with school or when she's in a bad mood and it fixes her right away. It acts as a reward a lot of the times and it makes her attitude and behavior change accordingly. When someone takes her iPad away from her, she decides to cry and have an attitude until the parents give up and give it back to her. This made us note that parents should have more authority in this type of situation for their own child's good and there is a lot of emotional connection childrens have to the device.

Appendix C

Interview 3

Shreya M, Junior, CS.

Date: February, 2022

Reason for Interview: Obtain the perspective from a college student who has a younger sibling in high school who identifies as a non-binary person

In this interview, we had a junior college student explain the advantages and disadvantages technology has offered her non-binary sibling while growing up. She essentially spends the whole day using technology ranging from things such as doing school work, homework, communicating with friends, or to relax. Due to the fact that they are gender-neutral, having access to technology and certain social media platforms has allowed them to find their niche communities online where they could relate with other people and eventually come out rather than being in a state of discomfort at all times. This certainly helped their confidence grow and ultimately helped her acknowledge her presence in the physical community. However, Shreya has noticed that they are so attached to technology that they decide to text people through their laptop or phone, as it's easier, rather than meeting them physically avoiding the whole physical interaction process that so many of us grew up with and so aren't really able to meet other people. In addition, they are very introverted and never really had the need to create soft skills to interact with strangers. Shreya mentions that we need to realize the changing times we are living in and we can't still live like we used to and so we need to definitely move towards giving restricted technological access to younger children as not only does it allow them to stay connected with the people they care about but allows for a successful transition into not being complete technological addicts.

Interview 4

Syed H, Freshman, Mechanical Eng.

Date: February, 2022

Reason for Interview: Obtain the perspective of an international student student who has a big age gap with his younger sister who is in middle school and lives in a different country

This interview allowed us to look into how international students, who are thousands of miles away from their homes, view technology as a boon to stay connected and as a curse that harms you mentally and physically. Syed notes that his younger sister spends the entire day since she wakes up till she is in bed at night using a technological device of some sort. When asked about their relationship, he acknowledges that only due to technology is he able to remain close with her otherwise he would have lost that bond that they currently share. Considering how dependent she is on technology, she loses attention to her surroundings or sometimes gets lost in mentally when not engaging with a device. This concerns Syed everyday as it shows that his sister is physically not present in conversations and is always distracted. In terms of the apps she uses, social media has allowed for unrealistic standards to be everywhere and when she sees that it makes her think that it is the norm resulting in her to compare herself with other people and their lifestyles, but she doesn't realize that people act for the camera on

Appendix D

social media. Moreover, he feels that enforcing a strict screen time allowance when his sister was growing up would have allowed to help transition easily without becoming a technological addict.

Interview 5

Andreas I, Freshman, CS.

Date: February, 2022

Reason for Interview: Obtain the perspective from a college student who has a younger brother in high school who has self-control in his use of technology.

My interview with Andreas was a particularly interesting one as he had generally more positive things to say about teens and technology, which was different compared to the responses of most other interviewees. His younger brother used technology with no restrictions, but Andreas said that it didn't negatively affect him in any noticeable way, including behaviorally. He said his brother used social media, but it didn't cause issues relating to self-image or personality. And, Andreas reported that he is generally able to control his screen usage without letting it take over his life and impede on his other activities, such as golf or school. Whether this is due to good parenting or inherent self-control skills, or a combination of both, Andreas does not know. But, he ultimately believes that technology is entirely safe and beneficial for teens to use without restrictions so long as they can handle the responsibility.

Interview 6

Dalia G, Junior, CMDA.

Date: February, 2022

Reason for Interview: Obtain the perspective from a college student who has a younger brother in high school who showed major behavioral changes using prolonged screen time.

It was interesting to hear Dalia's perspective on the interview questions as the things she had to say about her brother were generally opposite of Andreas' sentiments. According to her, extended screen times (over 4 hours per day) caused her brother to exhibit major behavioral changes. In addition to acting very jumpy and sensitive, he persistently talked about games, and given the chance, talked in game references. It was clear from her explanation that, if allowed to play for too long, games would entirely occupy the mind of her brother and make him unable to think about and focus on much else. She also mentioned that he had ADHD. There may be a correlation between that and his sensitivity to extended gaming times.

Interview 7

Liam M, Super Senior, Theoretical Math.

Date: February, 2022

Reason for Interview: Obtain his perspective on how his relationship with his younger brother has degraded over time through technology.

Appendix E

Liam talked to us about how technology ruined his fruitful relationship that he cherished earlier with his brother into a mere name-sake relationship. Since his brother was introduced to having his own smartphone and laptop, he was glued to it continuously and nowadays spends nearly 12 hours a day. After coming back from high school, he would end up spending the entire day on his computer either talking with friends, working, playing games, or relaxing. This, in turn, meant that he only got to spend around 30-40 minutes with his family every day. Liam said that this really annoyed him the most, as he just would not be able to spend time with his brother. To further add to this, whenever his brother used technology for a prolonged period of time and interacted with his family he was extremely hostile and irritative and all he could think about was going back to his screen so that he can interact with his friends online. His brother's attention span is very minor and he doesn't know how to spend time without using a technological device. Looking back, Liam wished his brother didn't have access to social media so that he could focus on himself, his family, and his friends more.

Interview 8

Arjun G, Junior, Industrial Eng.

Date: February, 2022

Reason for Interview: Obtain the perspective from a college student who has a younger brother in high school who plays video games whenever he has free time.

Arjun's brother participates in numerous extracurricular activities at school such as chess club and EYE volunteering so he doesn't have the time to be on his phone as much as some other teens but he still makes time to spend his free time playing video games when he comes home from school until 1 AM, resulting in a messed up sleep schedule. He used to be a shy type but since he started playing at least 6 hours a day on his xbox, and watching youtube/cartoons, he says he gained confidence in his communication skills talking with random people online but since he is a foreigner, he was shy of speaking English and would have learned not to be shy either way so Arjun is not sure if technology had any effect in helping him speak more fluently if he did not have access to one. Like the other interviews we have taken, his brother also showed signs of annoyance, irritation and emotional attachment to his devices when someone bothered his 'session'. He believes that since he himself is doing well in school and in life, it is better that young kids shouldn't have access to technology. Technology takes away much of peoples' free time wasting on playing video games and surfing webs when they can work on themselves to become a better person.

Interview 9

Jack S, Freshmen, Physics.

Date: February, 2022

Reason for Interview: Obtain the perspective from a college student who has a younger sister in high school who spends most of her free time using platforms like Instagram and Tiktok.

Appendix F

Jack's perspective was very neutral. His younger sister spent 8+ hours a day on her mobile devices. According to him, that affected her communication abilities and the way she talked to her friends and family but it did have an impact on their relationship as siblings. Jack felt that they would have been closer as siblings and would have spent more time together if she was on her gadgets less. Jack said that he could see changes in his sister's behavior with the use of technology but not always evidently. She seemed moody and absolutely drained off energy after being on her phone for long periods of time. According to Jack, technology has become an inseparable part of our daily lives but still screen time should be controlled. He also stated that in his free time he usually likes to go out and play while his sister prefers to browse social media like TikTok etc. He has also on one occasion caught his sister photoshopping her images in order to better 'fit in'. He also told us that he or his family does not have any restrictions in place for the use of technology but would like to have some constraints in the future.

Evaluations

For the evaluation, we asked the other group members to hop onto the Teams meeting to get feedback on our prototype. We provided a general purpose of our system before we got started and described where each screen was located in the document. The evaluators were Nick Bloom and Satwik Tadikamalla.

We asked Nick to walk through the prototype from start to finish. He described that the app was simple and straightforward in design that new users can navigate through easily since it was in a similar format to some of the common apps. He described that the only thing we should keep in mind is that he found the main dashboard screen a bit clustered with all its buttons and information. Although our team did not know such an app existed, he commented that our app purpose was similar to Net Nanny.

Next, we asked Satwik to go through our prototype but we gave him specific tasks for him to complete. The tasks were: to sign in and get to the main dashboard assuming that you are a new user, edit the restriction zone starting from the dashboard, log out of the account from the dashboard, and navigate to the support page. He successfully completed all of its tasks within the given time frame of 1 minute. We asked him to give us feedback on the app and he described that the dashboard seemed good and did not feel clustered for him. He found the list of disabled apps on the dashboard was useful. We asked him what he thought of the Activity log and the Leaderboards and if he thought it was unnecessary. He described that he found both useful since Activity log helps the user grasp an idea of what other users in the zone are doing, and the leaderboards provided an incentive for kids to be motivated and stay engaged.

Appendix G

As a researcher for our team, our prototype was successful in its way of showing the other team what our app did and provided an easy time navigating through the app from start to finish without much explanation.

What did not go well is that since we had a paper prototype instead of an actual app, it was hard to get proper feedback on what works and what doesn't through the screen sharing feature on Teams. Also, it was hard to get feedback on something that was only ideal and not an actual working system where things may look different in real life.

In the future, we would like to develop an actual working app through java so that we can ask the other group to navigate in real time system feedback instead of pointing at what they would do and describe their thought process on what they are doing on a paper prototype.



Figure 3: Initial Collection of WAN's

Appendix H



Figure 4: Grouping all the similar WAN's through color



Figure 5: Displaying similar category WAN's together

Appendix I



Figure 5: Displaying similar category WAN's together

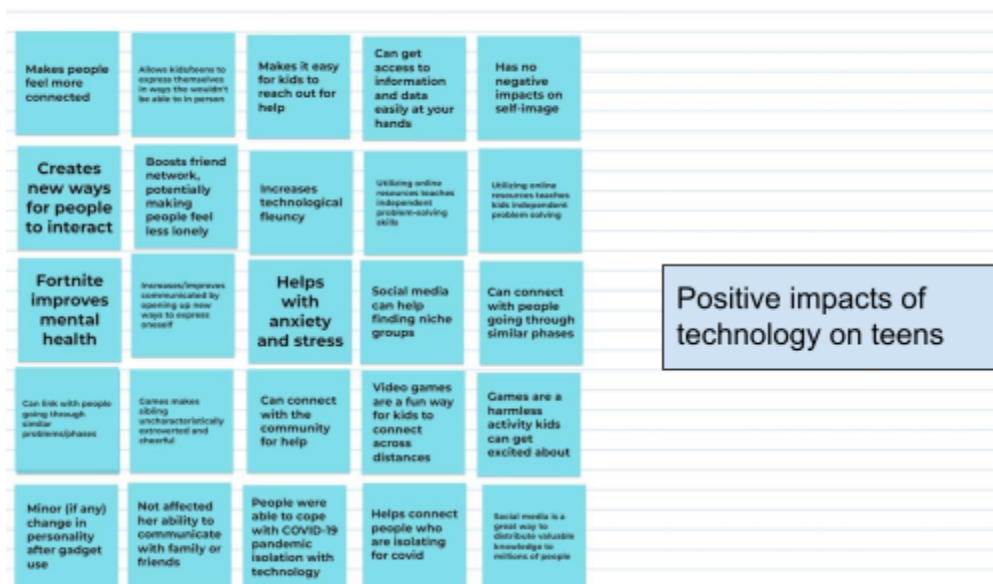


Figure 6: Categorizing this group of WAN's as positive impacts of technology

Appendix J



Figure 7: Categorizing this group of WAN's as the dependence of technology

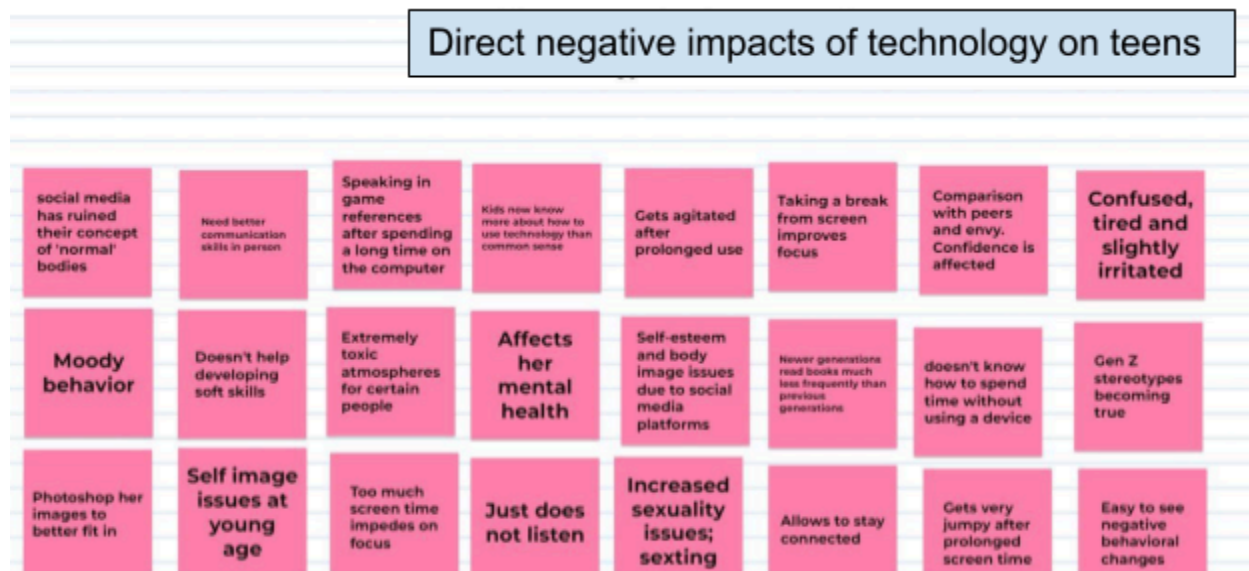


Figure 8: Categorizing this group of WAN's as the negative impacts of technology

Appendix K

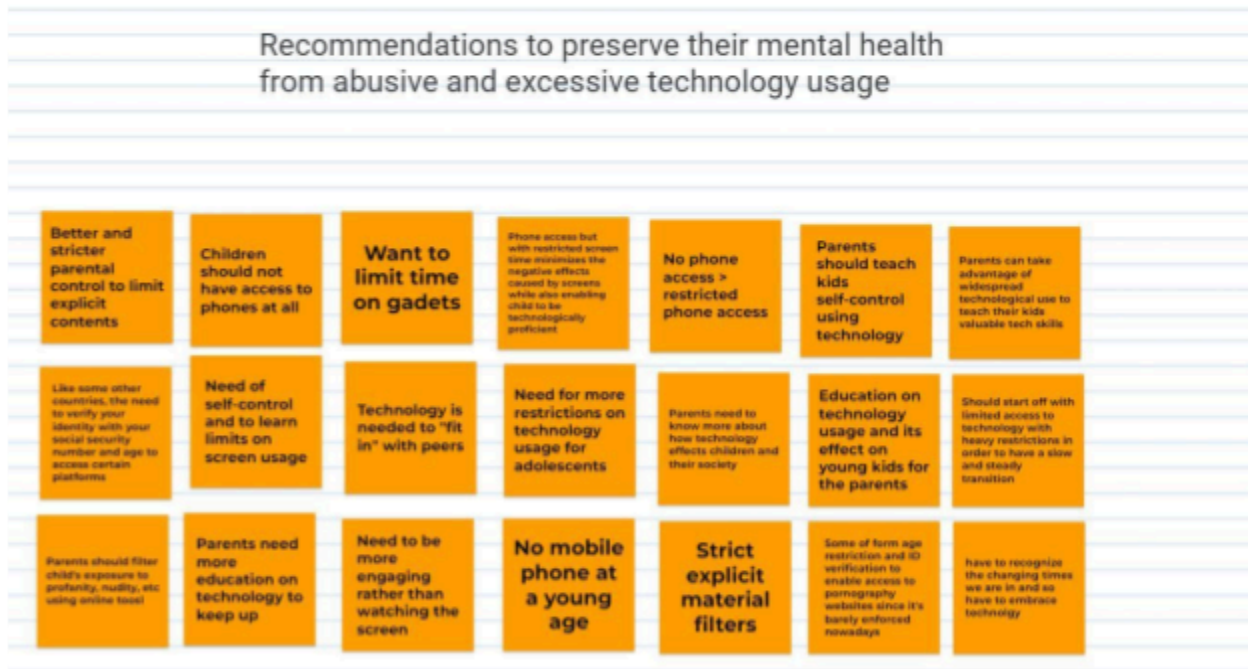


Figure 9: Categorizing this group of WAN's as the recommendations we received on how we can protect teens from technology's impact

Appendix L

Summary of most frequent barriers observed in the interviews conducted

Description	Model	% of Interviews	Count	Average Severity	Average Duration
Asking strangers to interview with us was difficult and awkward because of their uncertainty	Physical	100	16	1.5	20-30 sec
Some of the language used by the interviewer or interviewee was not understood due to cultural differences	Cultural	40	4	0.8	5 sec
Interviewer was going beyond the allocated time when interviewing our candidates	Sequence	20	5	1.8	70-90 sec
Computer wasn't set properly to take notes of what the interviewee was saying	Flow	15	3	1.3	10 sec

Appendix M



Figure 8: The final look of our ideas list

Appendix N

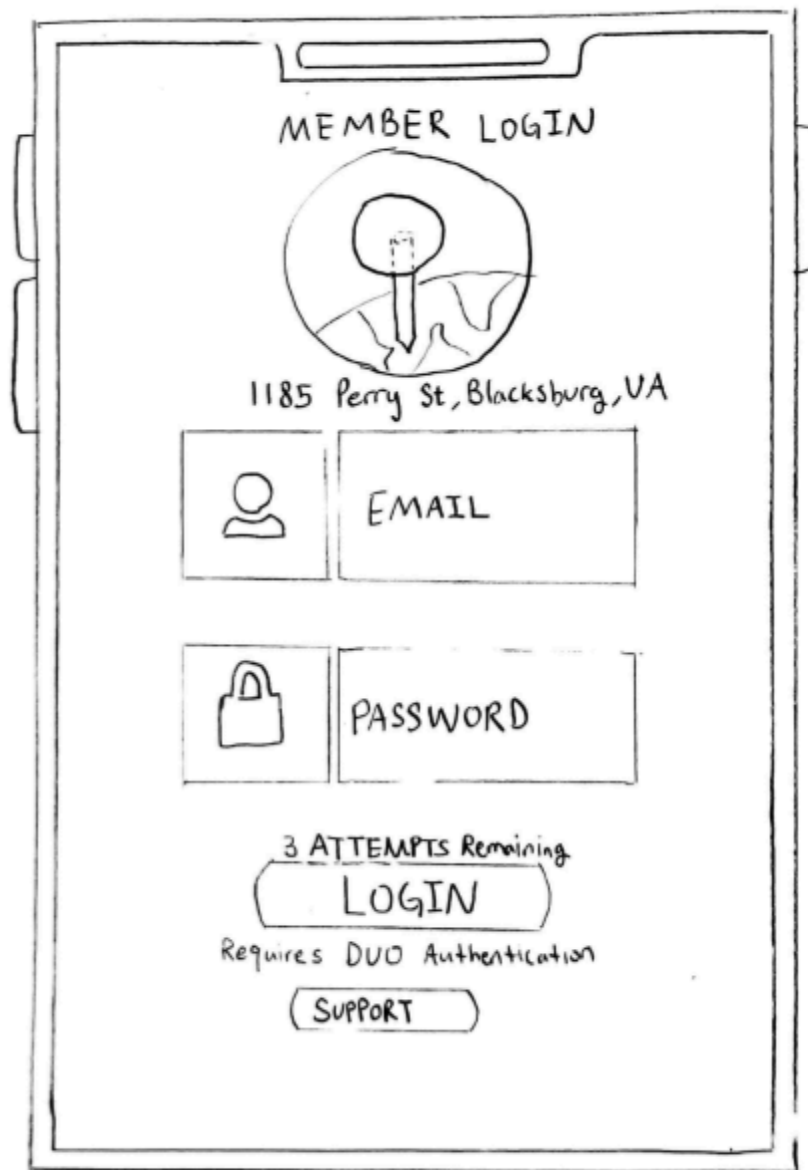


Figure 9: An initial sketch mockup of the login page

Appendix O



Figure 10: A sketch mockup of the timeoff dashboard page

Appendix P

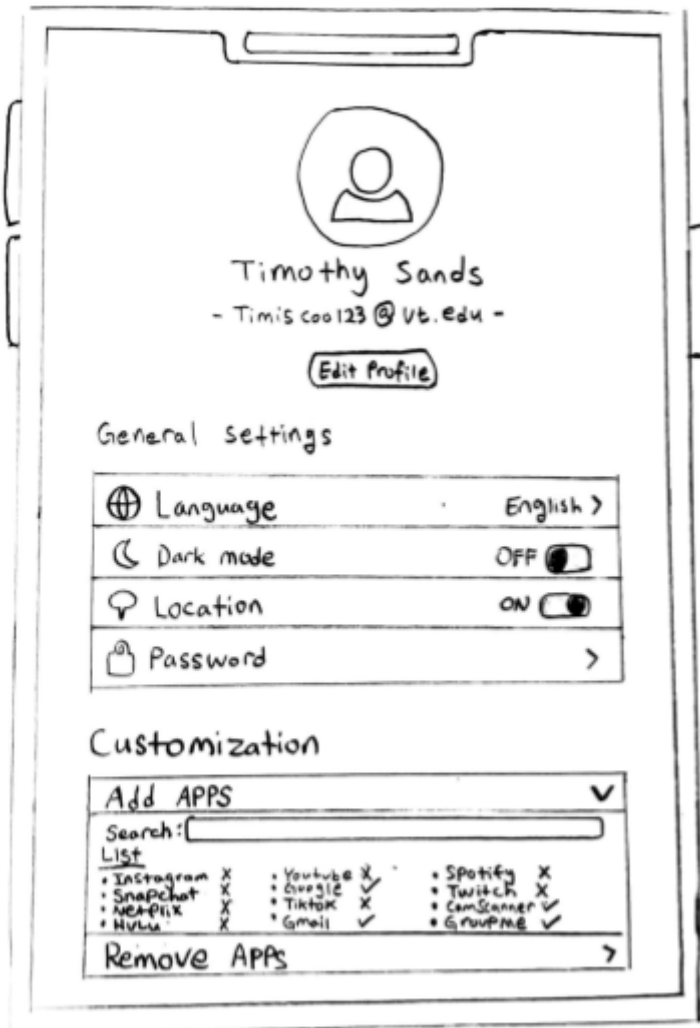


Figure 11: A sketch mockup of the settings page



Figure 12: An initial digital mockup of the leaderboard

Appendix Q-R

Work role: User Class	UX Goal	UX Measure	Measuring Instrument	UX Metric	Baseline Level	Target level	Observed results
Teenager: Casual user, for personal use	Initial clarity of feature	Initial user performance	Exiting a restricted zone using UI	Average rating across users and across questions	6.5/10	8/10	N/A
Teenager: Casual user, for school use	Initial customer satisfaction	Increase in quality of education	Gradebook	Analysis of grades from exams	10% increase in grades	25% increase in grades	N/A
Teenager: Heavy user, for personal use	Initial clarity of feature	Initial user performance	Questions Q1-Q10 in questionnaire XYZ	Average rating across users and across questions	6.5/10	8/10	N/A
Teenager: Heavy user, for school use	Initial customer satisfaction	Increase in quality of education	Questions Q1-Q10 in questionnaire XYZ	Average rating across users and across questions	10% grade increase	25% grade increase	N/A
Parent of a teenager	Ease of use for new user	Initial user performance	Ability to set up restricted zones	Time spent on task	1.5 minutes	30 seconds	N/A
Parent of a teenager	Initial customer satisfaction	Improvements in teen's quality of	Gradebook	Analysis of grades from	10% grade increase	25% grade increase	N/A

		education		exams			
Parent of a teenager: who is a casual user	Positive emotional impact	Teen's attitude towards app	Questions Q16-Q25 in questionnaire XYZ	Average rating across users and across questions	7.5/10	9/10	N/A
Parent of a teenager: who is a heavy user	Initial customer satisfaction	First impression	Questions Q16-Q25 in questionnaire XYZ	Average rating across users and across questions	7.5/10	9/10	N/A
School faculty: admins	Performance increase exhibited by students	First Impression	Questions Q26-Q30 in questionnaire XYZ	Average rating across users and across questions	8/10	9/10	N/A
School faculty: teacher/professor	Perceived value given restricted access to phones	Ease carrying out work role	Questions Q26-Q30 in questionnaire XYZ	Average rating across users and across questions	8/10	9/10	N/A

Table 1: Target table that showcases our UI goals

Appendix S

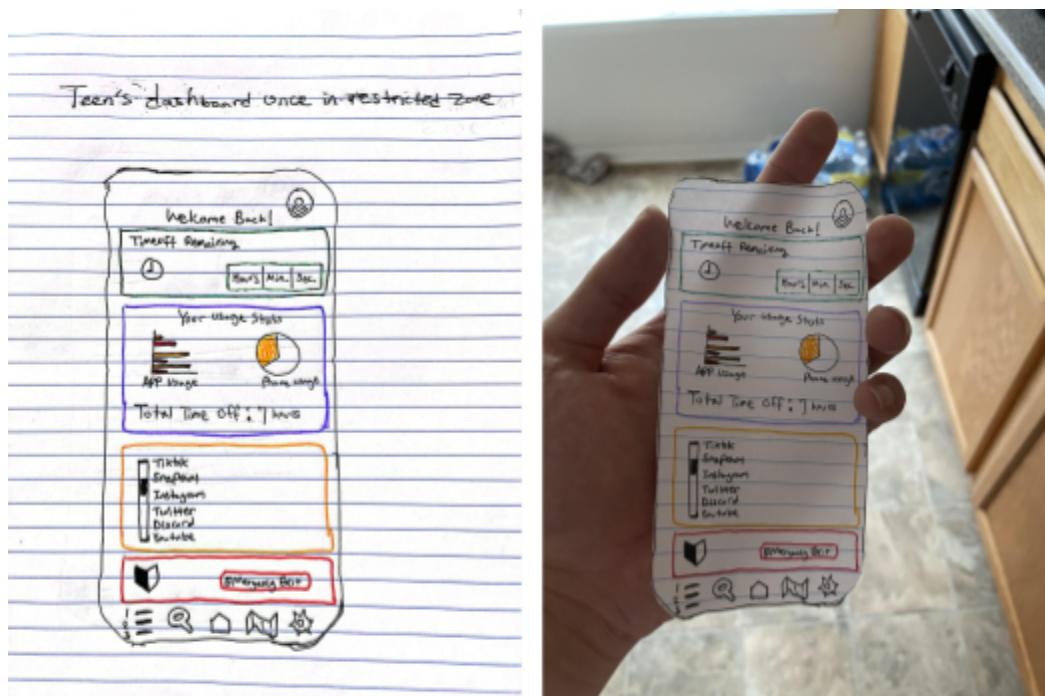


Figure 13 : Detailed mockup of restricted teen dashboard page



Figure 14: Detailed mockup of unrestricted teen dashboard

Appendix T

STEP 2: SELECT APPS
which apps would you like to restrict?

☒ Auto-Restrict

☐ Calculator
☒ Instagram
☒ Snap chat
☐ Gmail
☒ Discord
☐ Notepad
☐ Spotify
☐ Itner
☒ Netflix
☒ Hulu
☒ PUBG
☒ Diep. 10

FINISH

12/87
selected

STEP 2: SELECT APPS
which apps would you like to restrict?

☒ Auto-Restrict

☐ Calculator
☒ Instagram
☒ Snap ch
☐ Gm
☒ Disc
☐ Notepad
☐ Spotify
☐ Itner
☒ Netflix
☒ Hulu
☒ PUBG
☒ Diep. 10

FINISH

12/87
selected

Figure 15: Detailed mockup of selection of apps to restricted

Appendix V



Figure 16: Detailed mockup of the restriction zone setup page

Appendix X

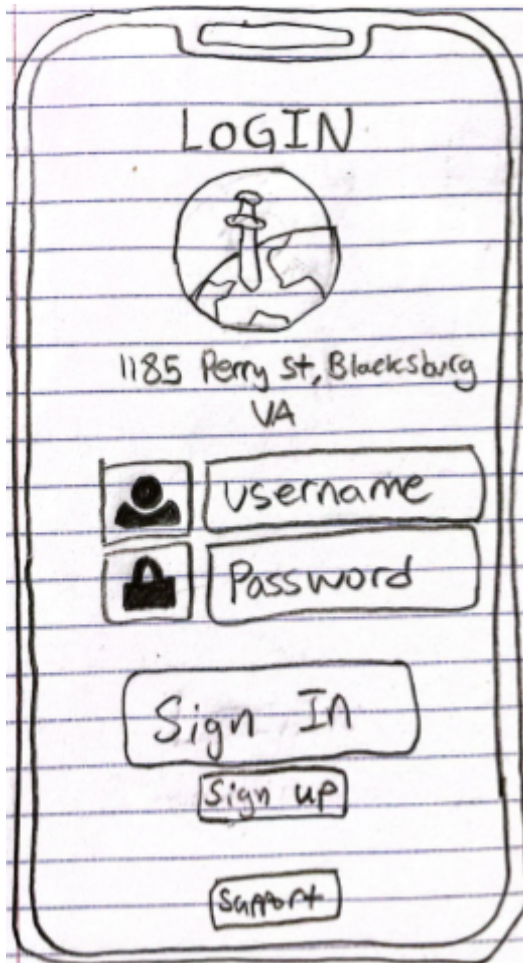


Figure 21: Final prototype of the login page

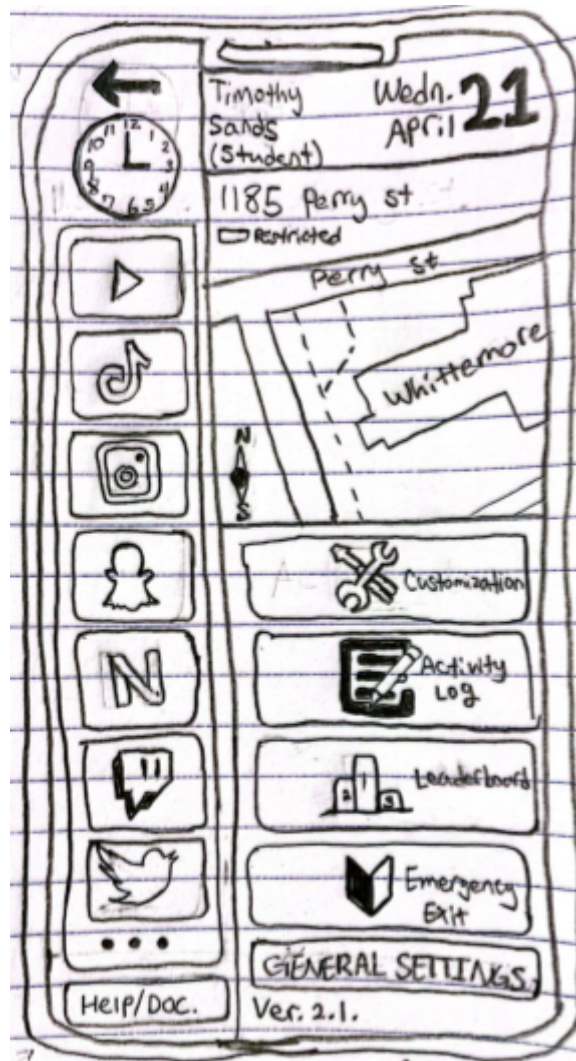


Figure 22: Final Prototype of the dashboard from parent's view

Appendix Y

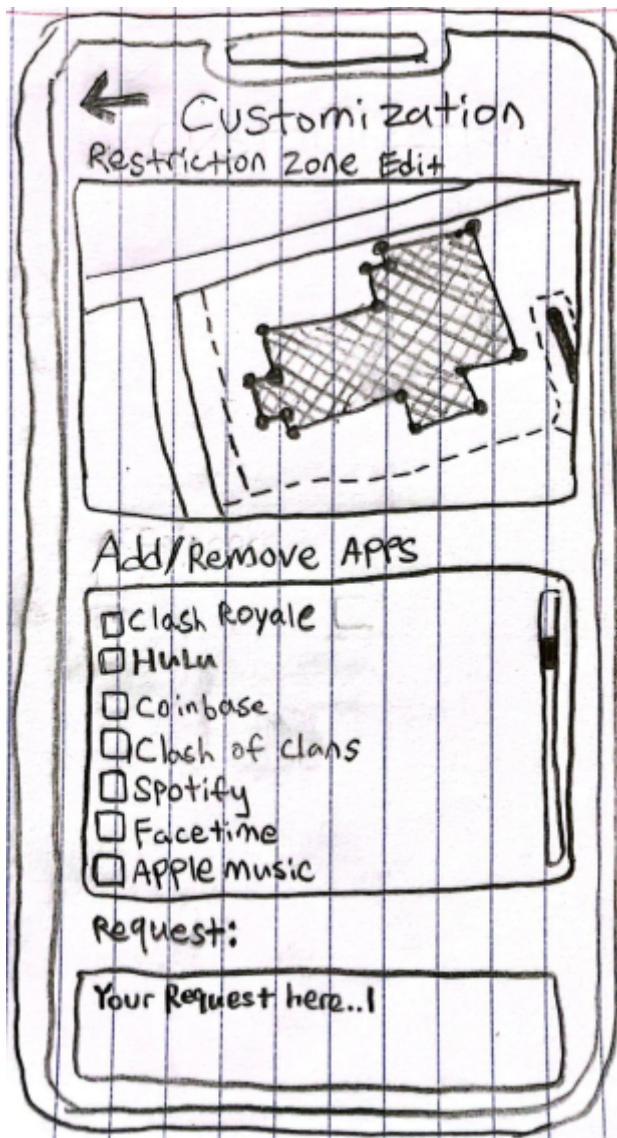


Figure 23: Final prototype of the restriction zone setup

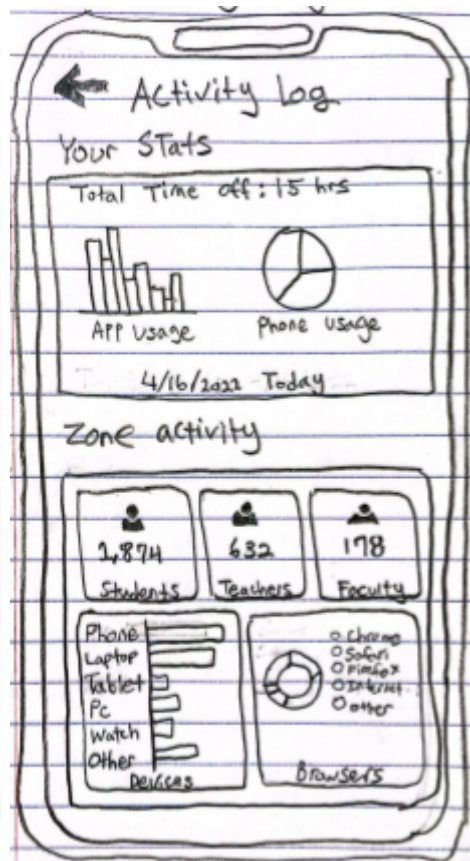


Figure 24: Final prototype of the activity log

Appendix Z

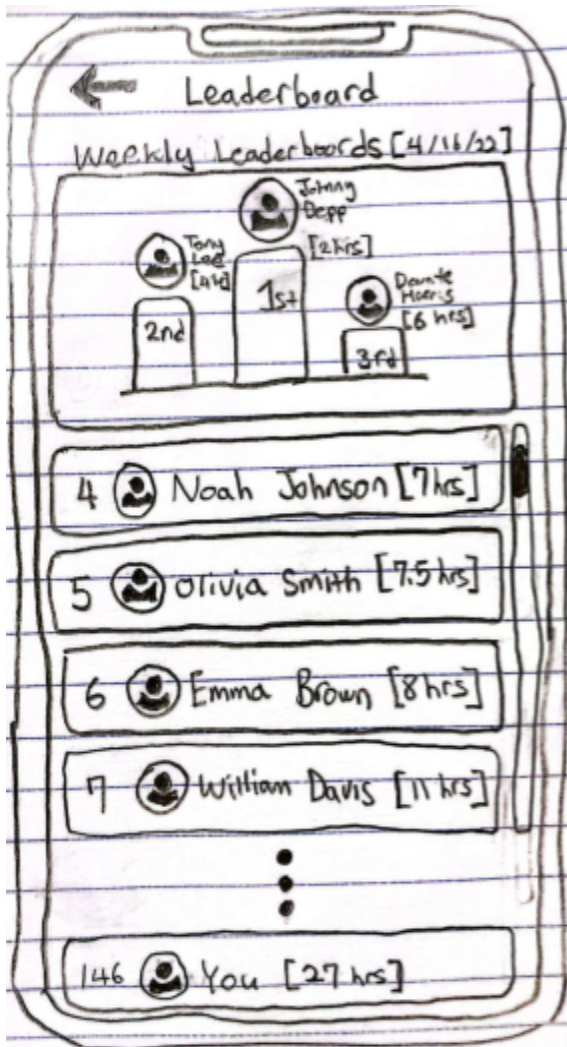


Figure 25: Final prototype of the leaderboard page

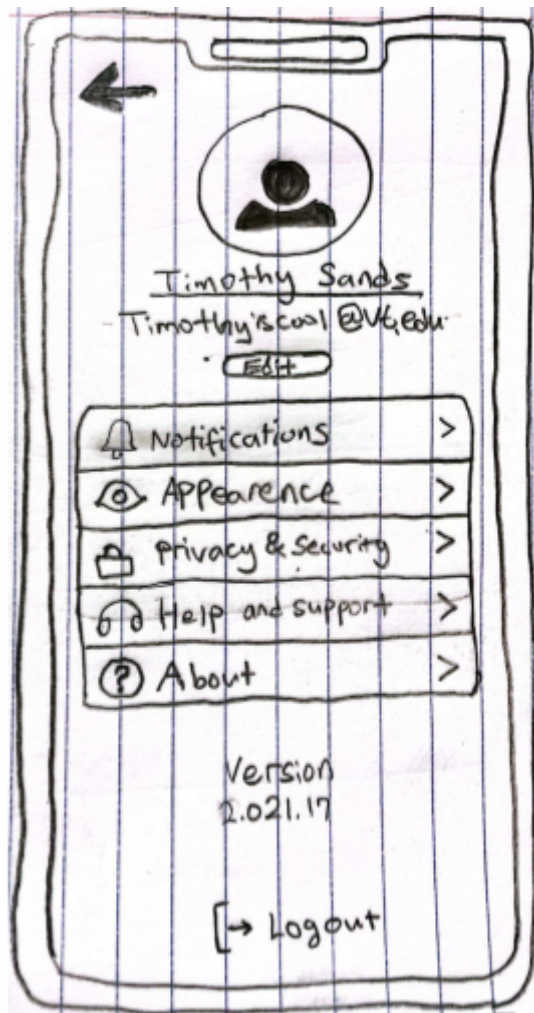
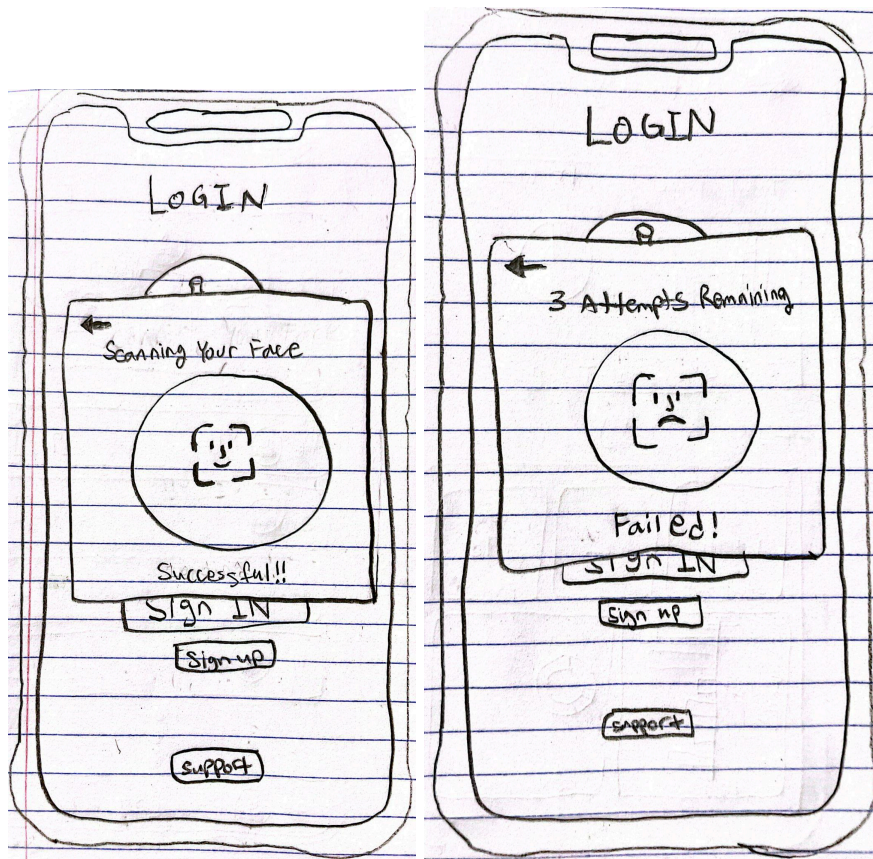


Figure 26: Final prototype of the settings page

Appendix AA



Appendix AB

Sign up

e-mail

password

Repeat password

Guardian Student

Address

BlackSong VA USA

Sign-up with

G F Apple

Read User License Agreement

Sign up

Support

Need some help?

? What solution? A

? Frequently asked Q's

- How to change Password
- How to edit restriction zone
- How to give access to Someone else?
- How to log out?

? Help by Category

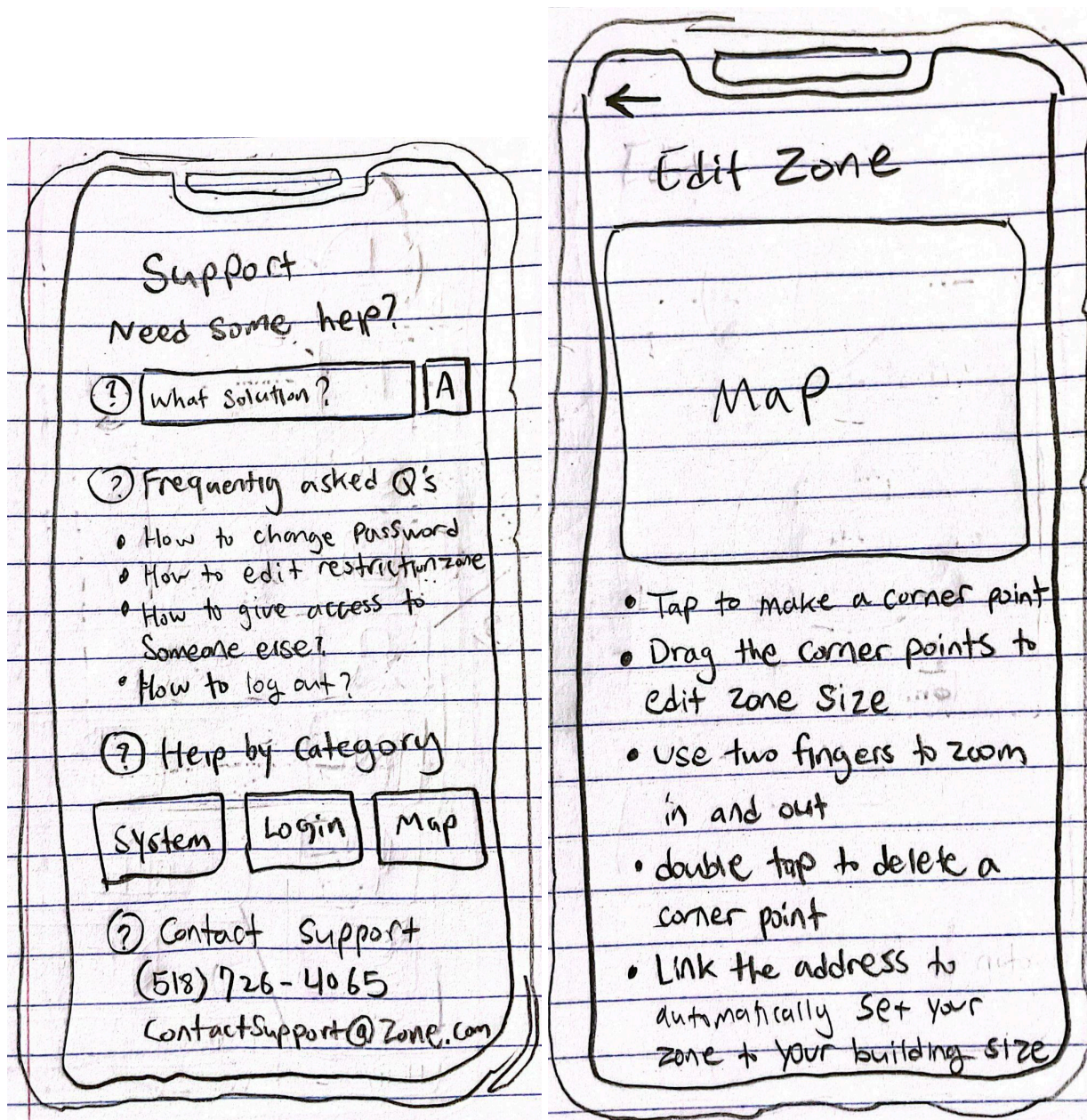
System Login Map

? Contact Support

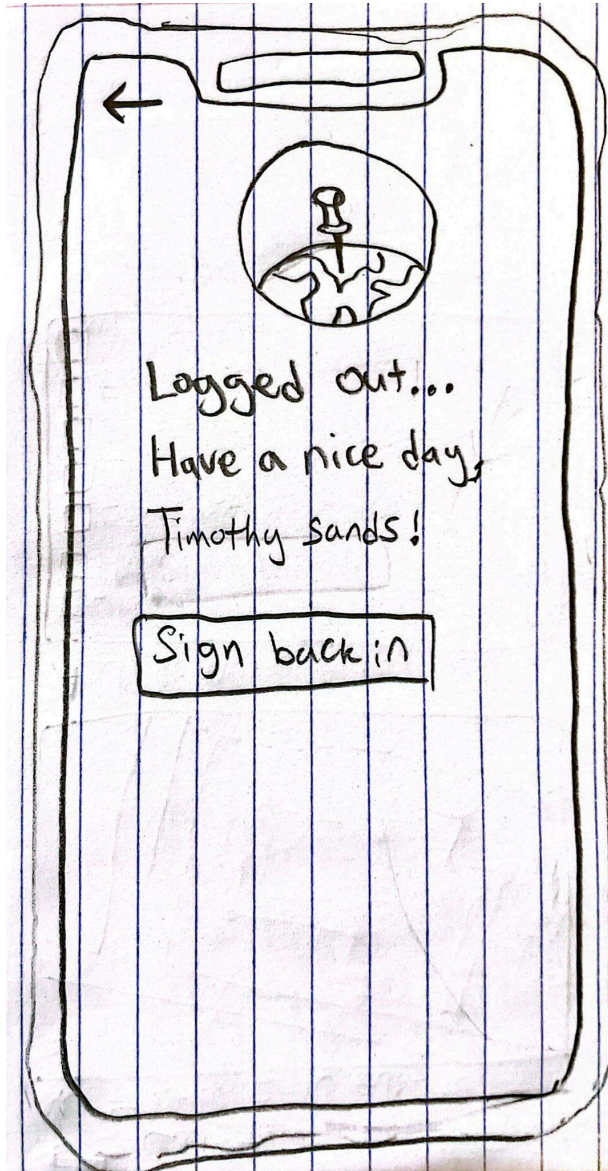
(518) 726-4065

ContactSupport@Zone.com

Appendix AC



Appendix AD



Appendix AE



Figure1: A persona of a potential teen and how he uses technology

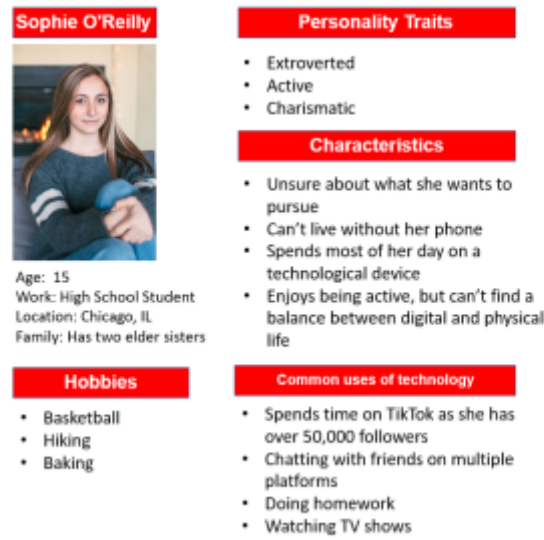


Figure2: A persona of a potential teen and how she uses technology



Figure5: This storyboard depicts Vlad entering the zone, where his entertainment apps are disabled until he goes home, helping him achieve good grades in school and enjoy his hobbies at the same time.



Figure 6: Prototype to create a restricted zone

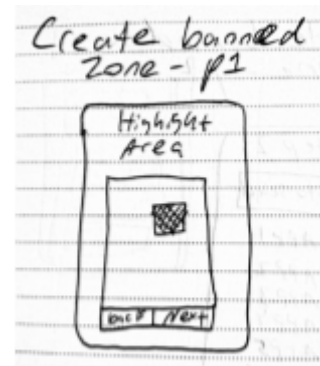


Figure7: Example Wireframes

Appendix AF

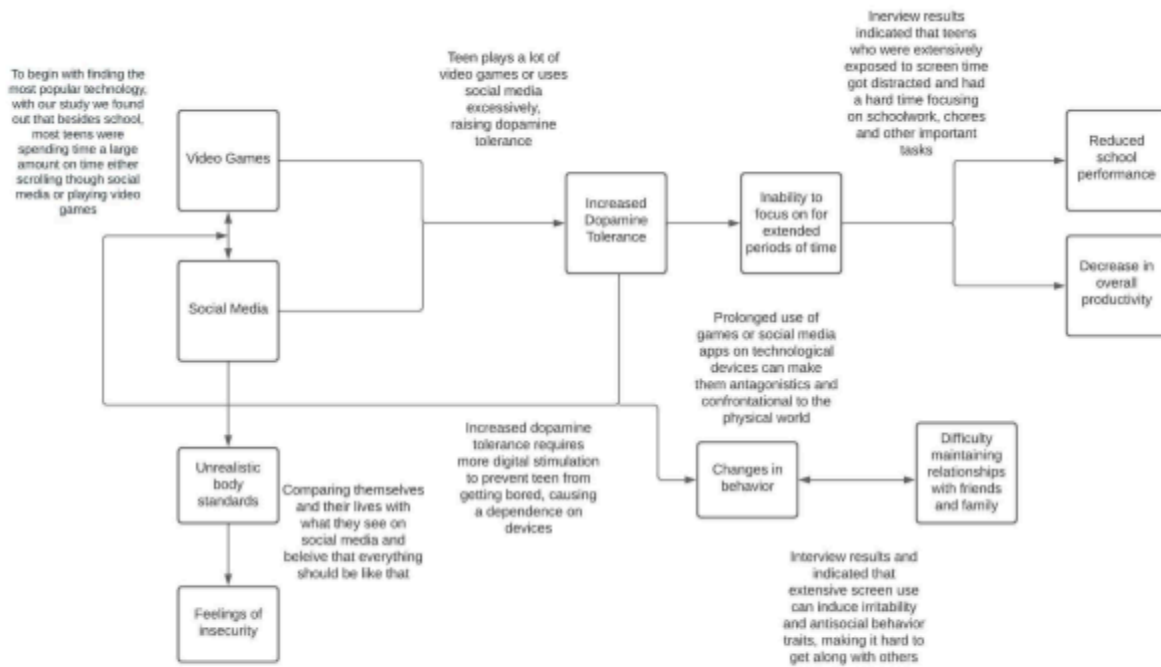


Figure3: A work flow diagram representing the information we collected



Figure4: Our primary persona of a potential teen and a detailed explanation on his uses of technology

Appendix AG



Figure10: An initial sketch mockup of the login page



Figure11: An initial sketch mockup of the timeoff dashboard page



Figure12: An initial sketch mockup of the settings page

Appendix AH

Cost

All the items that will be used during our pilot tests are listed below:

- Digital timer found on mobile phones
- Sheets of paper
- Writing Instrument

The combined cost of all the materials needed is very minimal and so from an economic standpoint it is clearly evident that conducting a pilot test would be extremely feasible.

Timings

After thorough deliberations and meticulous planning, we were able to decide which type of questions to include and based on that we were able to estimate how much time each stage of the evaluation would take. To bring the participants up to speed with what our product is, we will spend 15 minutes with the introduction and then the subsequent proposed tasks should be completed within 5 minutes with 1-2 minutes allocated specifically for the respondents to write down their feedback. We decided to give them this additional time to alleviate some of the common stress that comes with being interviewed.

We have 6 tasks in total which should take around 36-42 minutes in total to complete and in addition with our introduction it would be 51-57 minutes to complete. Now, it is also important to recognize that these are just estimations based on what we thought were recommended

Breakdown of time from example goes here

- 2:00 - Informing the participants about the instructions before they proceed taking the evaluation
- 3:00 - Giving an overview of the purpose and motivation for why we created our product
- 3:00 - Explaining what the system is and how it would work
- 4:00 - Brief rundown on the heuristics that our product is centered around
- 2:00 - Quick overview of our personas
- 1:00 - Respond to any last minute questions

The time breakdown for the completion of tasks is as follows:

- 0:30 - Informing the description of the task to the participants which they will also be able to read themselves
- 4:00 - Performing the task
- 0:30 - Extra allocated time in case there are any questions or to account for variance between each task
- 2:00 - Participants write down their responses for the task

Appendix A1



Figure17: A picture of how we had our interviews setup



Figure 18 : An image of our participant completing the questionnaire



Figure 19 : Participant visualizing how the app would feel through our paper prototype