

penguin

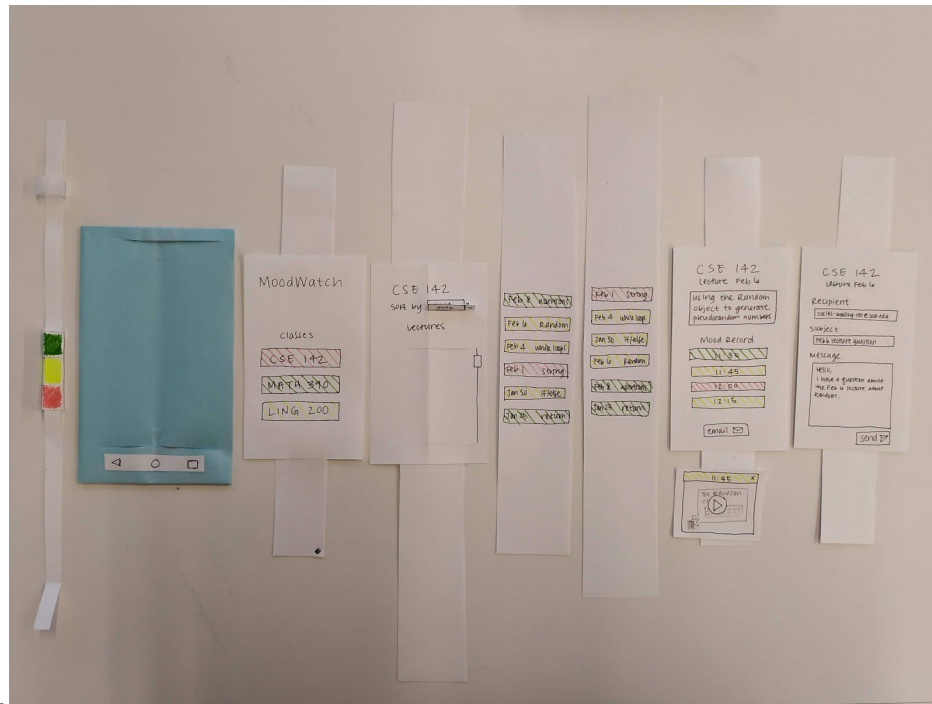
Kelvin Chung, Saba Davoudi, Kyle Pierce, Yuma Tou

Problem and Solution Overview

Attending college is a challenging and expensive venture. Because of the cost, students often feel obligated to make the most out of their college experience by learning as much as they can. The challenging nature of college, though, can get in the way of this. Students will often get so caught up just trying to scrape by in their classes that they will forget to take a step back and consider how they are feeling about the class. Routinely doing just that, however, can help students discover exactly what aspects of a course are most challenging for them and from there they can begin to take action to better understand the course content. This is the precise behavior we want to enable and encourage. MoodWatch allows students to do just this in an easy, minimally distracting way. By recording a student's mood in class in real time and by allowing the students to interact with that data at a later time, MoodWatch enables students to become more aware of their mood during classes. With this type of precise awareness, MoodWatch will encourage students to seek extra help when it is needed and will even make doing so more convenient. College is a vital time in a student's life and MoodWatch will help them make the most of that time.

Initial Paper Prototype

Our initial paper prototype involved two parts: a simple watch students could wear during classes and a mobile application in which that student could interact with the data they've recorded on the watch later on.



This prototype centers on two primary tasks. The first is **becoming aware of mood during classes**. We use the watch for this. Interacting with the watch is simple: tap on the screen and it changes to a column of 3 colored buttons. Green corresponds to happiness, yellow to neutrality, and red to unhappiness. Simply press one of the buttons to record your mood at that time. The watch will also vibrate periodically to remind you to think about and record mood. This would help students get used to thinking about and recording mood regularly in class, meaning their recordings would only become more useful over time.

Our second task is **reaching out for help when needed**. This is the app's primary purpose. The interface is relatively simple and follows the hierarchical pattern. Students can select a class followed by a lecture or topic to see their individual mood recordings. Everything is colored to represent the aggregate mood for that category (e.g. CSE 142 is red in the above picture, indicating the student is unhappy in the class). In the app, students can view Panopto recordings for segments of lectures and can easily reach out to course staff via emails with useful templates. These are among the most common ways we found students tend to reach out for help in their classes.

Testing Process

Heuristic Evaluation

The first part of our testing process involved two heuristic evaluations. We met with other groups currently in CSE 440 and evaluated each other's prototypes.

- 1) Evaluation with the Pawsitive team in NaN 181 after lecture. Kyle acted as the computer while Saba recorded notes.
- 2) Evaluation with the WastePlacer team. Yuma operated the watch and applications and Kelvin acted as the note taker.

With these two teams, we walked through our initial prototype and discussed our primary tasks and how they are supported. We worked through all of Nielsen's heuristic principles with them, discussing shortcomings for each principle. The groups also helped us quantify the severity of the issues on note cards. We later returned to the flaws and assessed the fixability. We then used this information to adapt our prototype before usability testing.

Usability Testing

Our first participant, Jack, is a senior studying Computer Science at UW. He sporadically attends class but when he attends, he takes detailed notes. As someone who pays close attention in his classes and takes notes by hand, he fit our target audience perfectly. We conducted this test in the CSE labs, where the noise level is similar to that of a classroom (i.e. there are some distractions). Saba and Yuma observed and took notes, Kelvin was the facilitator as he administered the tasks, and Kyle was the computer as he operated the app.

Our second participant was Ken. He is a junior at UW. He usually goes to class but often feels lost in lecture. This meant that he was a good choice for a usability test for our design because he is someone who, by his own admission, would like to record that he often feels bad about lecture. We conducted the usability test in the CSE labs because the noise level is similar to that of a classroom. Saba was the observer, Yuma was the computer, and Kelvin was the facilitator.

Our third participant was Flor. She is a junior at UW. She cares about going to class and listens to lectures. She usually cares about the topics that confuse her during a lecture, and she likes to record and organize her confusions to have more efficient studying. We conduct the test in one of the CS labs because the noise level is similar to that of a classroom. Saba was the observer, Yuma was the computer, and Kelvin was the facilitator for this test.

In our first test, we did a poor job of introducing the design. We improved this for later tests, which helped testers understand the prototype a bit better. This meant that we were able to assess the usability of our prototype to a much greater degree in these latter two tests, which helped us decide on and implement our final revisions.

Testing Results

Heuristic Evaluation

In the heuristic evaluation, much of our feedback centered on fluid and powerful navigation of the application as well as introducing useful documentation.

User Control & Freedom (severity 3):

Two really important flaws were recognized with our design in relation to this heuristic. The Pawsitive group noted that we currently had no way to undo a mood classification, which could make the recorded data considerably less useful and accurate. They also noted that there was no way to cancel sending an email from the template page.

Help & Documentation (severity 2):

The feedback we received in this vein was to give students help inputting their classes and syncing the watch to a smartphone. We do not plan to act on either of these. Our plan is for classes to be synced automatically with MyUW or equivalent and to connect the watch with a phone via bluetooth, which means little to no documentation should be needed for those.

Flexibility & Efficiency (severity 2):

Our advice here was to allow users to log mood whenever they want (this was already being supported) and to support updating mood on certain topics and storing brief notes with each mood recording. We added support for both of these features.

To address the feedback from the heuristic evaluations, we migrated from a watch to pen to allow for taking notes alongside mood recordings. We also updated the app to have more undo-related functionality and some documentation as well as to clarify how class information is obtained. Finally, we broadened the interactions students could have with their data to support things like updating the mood for certain topics.

Usability Testing

Our first test was plagued with a general lack of clarity for our tester. In particular...

Help & Documentation (severity 4):

Two major incidents stood out here. First, the tester was confused about the color of the classed on the app's landing page. He assumed these were colors arbitrarily given to each class and that these indicated which button to press in which class. We have since added a brief tutorial to the landing page of the app to address this.

Secondly, the tester was unable to update the mood for a lecture in the app. He walked up and down the interface trying to find the place to do this until he eventually gave up after a minute or two. This is an important feature, so we expanded the tutorial to include an explanation of process and where it could be performed.

The issues in our second test were a bit more minor...

User Control & Freedom (severity 2):

The tester struggled to navigate backwards after sending an email to the course staff. Because there was no mechanism for working back, the tester ended up cancelling the email (which had already been sent). We adjusted the prototype to give a clearer confirmation and take the student back to the previous page automatically.

Match Between the System & Real World (severity 1):

Ken also struggled to update his mood in the app. He admitted this was because there was a mental conflict between his expectations of a piece of paper and a phone -- he admitted that he did not consider long pressing on a piece of paper, but he might have on a phone. This is not easy to fix, but we explained it more clearly in the last test.

The third test showed that updating mood in the app was still not clear...

Help & Documentation (severity 3):

After dismissing the modal explaining how to update mood in the app, Flor realized she did not know how to update her mood and was unable to show the modal again. We updated the in-place mechanism which allows student to view the tutorial again to be more noticeable to try to mitigate this in the future.

Consistency & Standards (severity 3):

Since we (unintentionally) made some of the text in the tutorial look like a hyperlink, Flor clicked it and expected something to happen. We removed the underline from the text so that it resembles a hyperlink less.

User Control & Freedom (severity 3):

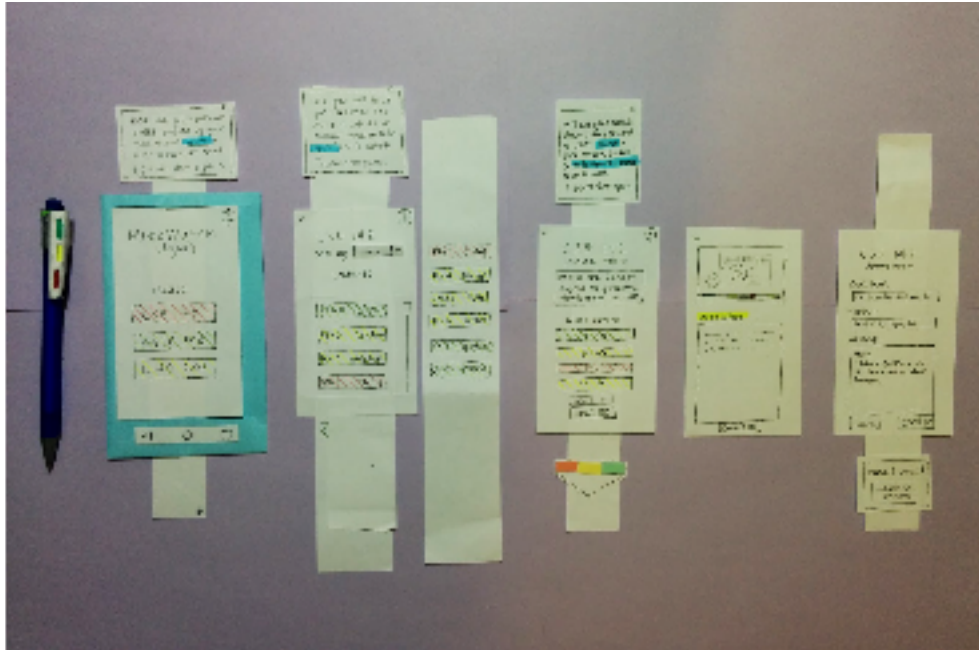
In an attempt to update her mood for a specific time interval, Flor tried to update the notes that were recorded to reflect the updated mood. This is not something we plan on supporting, but we can work on making the tutorial about this more helpful.

Design Critique

We learned a few really useful things from our critique in class. Instead of just saying "OK" as a confirmation message, it would be better to say something like "Email Sent" to make it even more clear for students using the app. In addition, it was noted that it is inconvenient to go between the Panopto & notes page and the email form. The suggestion was to add a button to easily go between the two so someone does not have to navigate backwards to the lecture page and then over to the desired destination. We agree that this would be very useful so it has made it into our final prototype and mockup.

Final Paper Prototype

In our final prototype, you will notice that we've moved from a watch to a pen. The same three colored buttons have been retained and can be found near the top of the pen, making the interface just as simple as the original prototype. Our app is largely the same with some key additions. In particular, we have added a tutorial accessible via the "?" in the upper-right corner. We also added a back button and some other tweaks for better navigation.



Our first task, **becoming aware of mood during classes**, is just as easy in the updated prototype as in the original if not easier. Just like the watch, the act of having the pen and seeing the buttons can serve as a reminder to consider one's mood. In addition, we can support the same functionality in terms of regularly causing a vibration in the pen to prompt for mood if it has not been recorded for a while. The student can view these recordings in the application.

Our second task, **reaching out for help when needed**, has also become a bit easier. The basic flow of the app has remained unchanged, but the addition of a tutorial will help students become more comfortable with using the app. In addition, we added features like a consistent back button and easy navigation between the Panopto page and the send email page to make going between the two easier. Since the app became easier to maneuver and understand, students should have an easier time viewing and updating their mood. Since these recordings are the driving force for getting help, this improvement will help this task.

Digital Mockup

Overview

As a whole, our digital mockup is very similar to our final paper prototype. We have two components -- the pen and the application interface. The pen has no distinct differences from the one in the paper prototype. The most notable difference in the mockup from the prototype is in the addition of information on the landing page. For each class in which a student is enrolled, instead of only seeing the aggregate mood for the class, they also can also now see how many moods they've recorded of each color. This came from our final critique and gives a much better sense of where the student's attention is needed most. Our design transitioned well from a paper medium to a digital one, so we did not need to make other changes besides some general UI improvements.



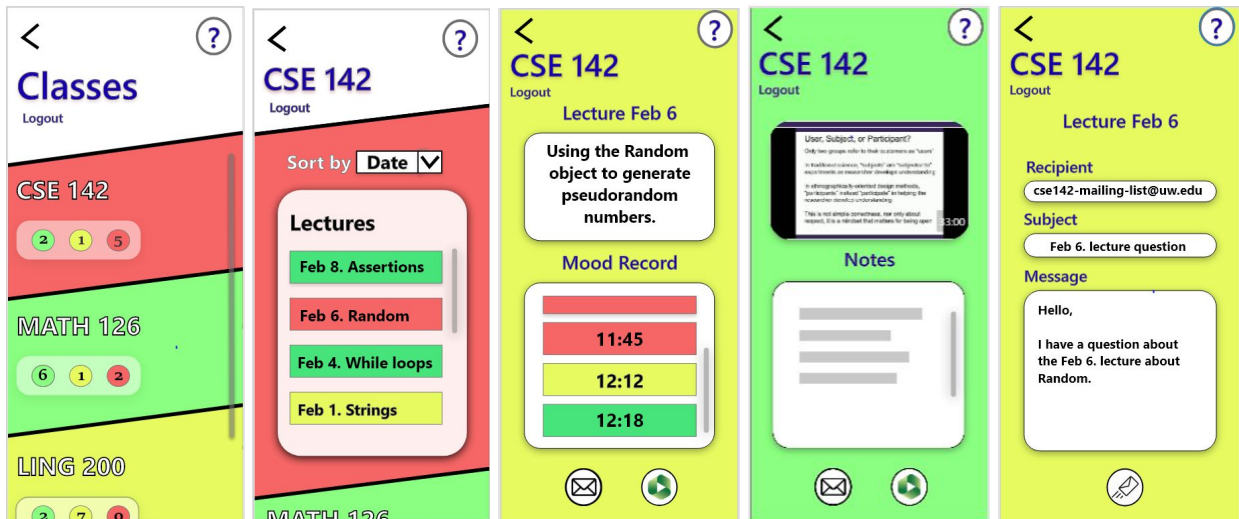
Digital Mockup (continued)

Tasks

Our mockup supports our first task, **becoming aware of mood in classes**, in two main ways. The pen allows students to record mood in class and even reminds them to do so (not pictured). Students can then open the app and navigate the interface to view these recordings and update them if there was a false recording.



Our second task, **reaching out for help when needed**, is supported completely in the application. Students can select a class, select a lecture, and then select a time to see the Panopto for that moment in time alongside any notes they left with their mood recording. From the lecture page, they can also reach out to course staff if more help is needed. There are tutorials to help students figure this out at every step on the way.



landing page

view a class

view a lecture

watch Panopto and
view notes

send an email

Discussion

What did you learn from the process of iterative design?

Even though we put a lot of thought into our initial designs, there were still so many flaws (small and large) that we never considered. Thankfully we followed the process of iterative design presented in the class and continuously got feedback on our design. This allowed us to find issues, address them, get them tested, and find more issues. We could not possibly have done this in just one pass because each issue we fixed brought other (hopefully smaller) issues. So more than anything, we are now really convinced that you cannot get a design perfect in a single go and we recognize the power of iterative design for producing good designs.

How did the process shape your final design?

Our biggest example of this is the finished state of our tutorial and documentation in the app. We thought we designed a very clear interface in the first place and so we didn't have a tutorial. It quickly became clear that this was not the case, though, so we added some help modals the problematic areas. Once we did this, our testers wanted the help in other places as well. Fair enough, so we added those. Then testers wanted to be able to see those help modals again when they accidentally close them or forget what they said. So we added that into our application. This is a good example of iterative design being successful because our feedback from one test spurred more feedback in the later tests, which means we could not have gotten all the feedback in just a single round of testing and adaptation.

How have your tasks changed as a result of your usability tests?

Our first task, **becoming aware of mood during classes**, has grown a bit. We knew from the start that this would implicitly include recording that mood in addition to just being cognizant of it. We did not realize just how important it would be to be able to update those recordings as well, so our task had to evolve a bit to include this. This is now done in the app, where the pen was previously the sole focus of this task.

Our second task, **reaching out for help when needed**, did not evolve as much. The basic means for doing this have remained the same -- watching Panopto and emailing course staff. Our initial research motivated these as our choices, which made them resilient ones. Achieving this became easier in the app, but the fundamental task did not really change.

Do you think you could have used more, or fewer, iterations upon your design?

We definitely could not have used fewer iterations on the design. We feel every iteration was meaningful and that our design would be lacking without any of them. Could we have used more? There are probably more flaws in our design that additional iterations would expose, but such a mindset could lead to us never closing the design diamond. So we feel we probably did enough iteration, although more would likely have led to further improvements.

Appendix

Purpose of Testing

The purpose of this usability test is to examine the usability of pen and application, and explore the weakness and strength based on participants' feedbacks. Also, how the participants perform and interacts with the design to complete the tasks.

Target Audience

Students who usually attend their classes, pay close attention in their classes, care about their moods during class, and take notes by hand.

Roles

Facilitator: Conducts interview and provide participant with the tasks. (Yuma)

Observer: Takes notes and observe the participants tasks. (Saba)

Computer: Interacts with participants and operates the paper prototype. (Kelvin and Kyle)

Study Script

Hello and thank you for participating to our usability testing. We will ask you to complete set of tasks using paper prototype that we have and provide us with feedbacks during and after you are done with the tasks. This test will take about 15-20 min. Our design includes a smart pen and an application that helps students to record their mood during a class in real time and allow students to interact with that data at a later time. You only use the smart pen during class. Also, please be aware that we are trying to test the usability of our design, and you are not the one being tested. During performing tasks, we are not able to show you how to perform them, and confirm your correctness, but we are able to read the assigned tasks for you and perform your interaction with the design (pen and app). Please think aloud during performing tasks and let us know your confusions during performing them.

At the end of the study, we will have more time to discuss and answer your questions, but before starting the test, do you have any question?

Our first task will be during a lecture using the pen, and second task will only use the app.

Appendix (continued)

Task 1: becoming aware of mood during classes

The participant is in CSE 142 lecture, listening to a lecture on the Random object. They turn on their pen at 11:30 when the lecture starts. This task involves the participant recording their mood during lecture using the pen.

Task 2: reaching out for help when needed

The participant went to lecture for CSE 142 on February 6th during which the instructor covered the Random object. This task involves the participant reflecting back on this past lecture using the smartphone application.

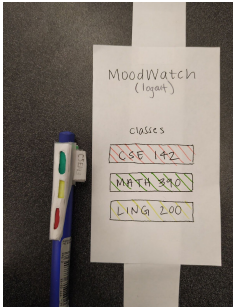
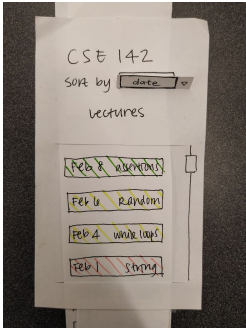
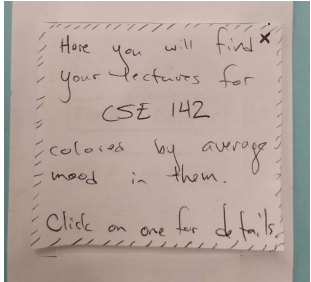
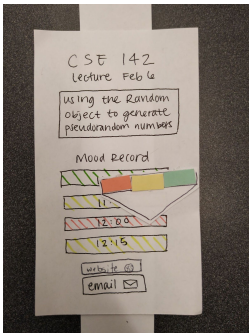
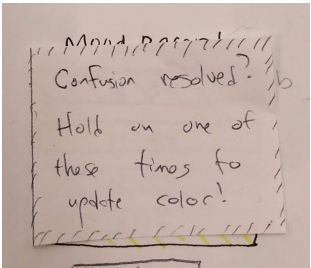
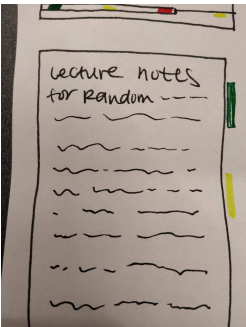
These tasks were read aloud by the facilitator and they have been repeated whenever participants requested.

Outcome

We were able to identify weakness, strength, and failures of our design based on participants' feedbacks and apply their feedbacks to improve our design.

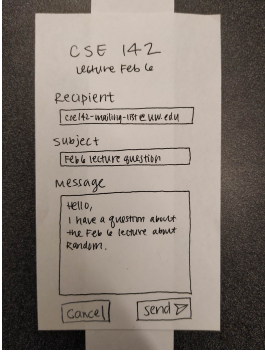
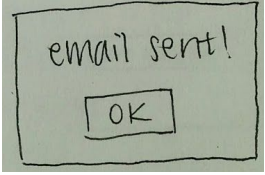
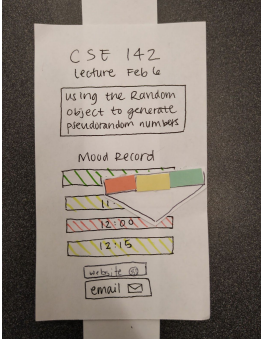
Appendix (continued)

First Usability Test

Relevant Section	Incident	Severity	Revision
	<p>Was unsure whether the colors on the pen corresponded to the class or the mood</p>	3	<p>We think this incident was a result of insufficient explanation when introducing the project. We will work on a better introduction for later usability testing to see if this issue arises again.</p>
	<p>Was unsure what the color of the lecture title indicated (whether it corresponded to the majority color or the last color)</p>	2	 <p>Add a tutorial.</p>
	<p>Very confused about how to update mood for a specific time and lecture from within the app</p>	4	 <p>Add a tutorial.</p>
	<p>Expected a response from clicking on text within the notes section</p>	1	<p>Not easy to fix and not very severe. Will not implement.</p>

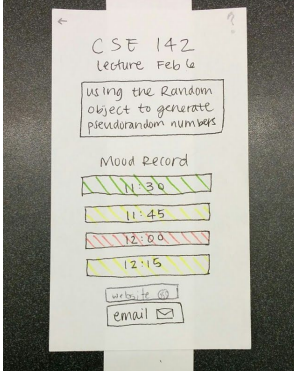
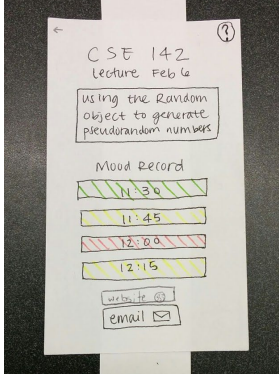
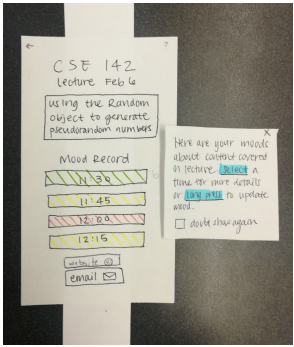
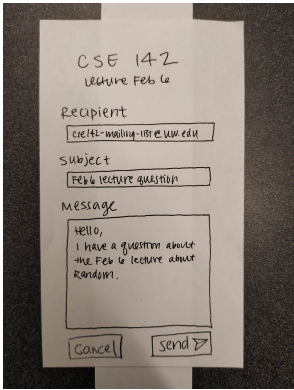
Appendix (continued)

Second Usability Test

Relevant Section	Incident	Severity	Revision
	<p>After an email finished sending, it was unclear how to return to the previous screen after the “email sent!” pop-up appeared -- he pressed the “cancel” button</p>	<p>2</p>	 <p>We will update the “email sent!” pop-up to have an “OK” button to confirm the email being sent and return to the previous screen.</p>
	<p>There was some slight confusion about how to update mood for a specific time -- he mentioned thinking about doing a long press, but seemed to think it was not possible</p>	<p>1</p>	<p>The issue stemmed mainly from (by the participant's own explanation) that a long press wasn't supported due to it being a paper prototype. For the next usability test, we will be more clear that any action that could be taken on a phone is fair game.</p>

Appendix (continued)

Third Usability Test

Relevant Section	Incident	Severity	Revision
	<p>Very confused about how to update the mood for a specific time, wanted to see the tutorial again but could not figure out how (did not notice the question mark in the top right)</p>	<p>3</p>	 <p>Make "?" more noticeable</p>
	<p>Thought the text saying "long press to update mood" in the tutorial meant to long press on the words "long press" rather than the times</p>	<p>3</p>	<p>We will remove the underline on "long press" (since it made the words seem like a hyperlink) and change the wording of "long press" to be more clear</p>
	<p>Tried to change the notes for updating the mood.</p>	<p>3</p>	<p>We will make the tutorial more clear for updating the mood.</p>

Contribution Statement



Kelvin **25%** finalized mockup and worked on report



Saba **25%** compiled appendix and worked on report



Kyle **25%** formatted and worked on report



Yuma **25%** finalized prototype and worked on report

Penguin by Chanut is Industries from the Noun Project

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