

Coursera - Gesture-Controlled Note Taking

A Human-Computer Interaction Project Report by

Team 1

Divyansh Tomar
Siddharth Jain
Subhash Kashyap

Submitted to Dr. Sudheendra Hangal, CEO, Amuse Labs
Ph.D, Stanford University,
Plaksha Tech Leaders Fellowship 2020-21

Table of Contents

Coursera - Gesture-Controlled Note Taking	1
Abstract	3
Introduction to the Problem	3
Background/Related Work	3
Understanding User	4
Prototyping 1	4
Methodology and process	4
User Testing 1	5
Methodology	5
User Reactions	6
Learnings	7
Prototyping 2	8
Methodology and process	8
User Testing 2	9
Methodology	9
User Reactions	10
Learnings	10
Prototyping 3	10
Methodology and process	10
Conclusion	12
Team	12
Shared	13
Divyansh	13
Siddharth Jain	13
Subhash	13
Gallery	13

Abstract

The global massive open online course (MOOC) market was valued at USD 6845.4 million in 2020, and it is expected to reach USD 18925.18 million by 2026, with an estimated CAGR of 18.13%, during the period from 2021 to 2026 (“Massive Open Online Course (MOOC) Market | Growth, Trends, and Forecasts (2020 - 2025)”). With such a backdrop, interventions to improve effectiveness in the delivery of online education offer exciting opportunities at creating a positive impact. Ours was an exploratory project to introduce gestures as a way of interacting with digital learning platforms such as Coursera. The feature we chose at the beginning of our process is gesture-controlled note-taking. Through our experiment, user testing, and discussions we realized that there is a much larger value addition for users to instead have a gesture-controlled screen capture rather than note-taking and that users prefer simple to perform gestures over complicated ones. We found openness in general in users to adopt gestures but that the use cases need to be explored in a lot more breadth and depth. We are aware there is a lot more scope to introducing gestures and more user testing needs to be done but the process of quick prototyping and testing with users proved very useful at accelerating our process to move in the direction of creating something truly useful and engaging for users.

Introduction to the Problem

We were keen on exploring gestures as part of our project. We identified 2 main scenarios where they offer a great value proposition, one, a permanent or temporary handicap such as while driving a car or a disability and two, preventing the breaking of flow by aiding a user in performing a cognitively heavy task to accomplish a goal. The other backdrop that was alive in our minds was the shift in the education paradigm to online that has come about due to COVID and ourselves being in the very middle of it as students. We continued brainstorming on platforms such as Zoom and Coursera for MOOCs (Massively Open Online Courses). Eventually, through conversations amongst ourselves and with our instructor we chose to go with gesture-controlled note-taking on Coursera, which is a platform for MOOCs. We were slightly sceptical about this choice since Coursera already has a click to save note feature on their platform and capturing user' gestures would need access to their video feed and so we wondered if bringing in gestures for note-capturing would really offer a great value addition. But we received encouragement on our choice to take it as an exploration and that it offered an opportunity to think a little bit out of the box in terms of creating a prototype and designing our experiment for testing with users. The feature we chose to test - a pre-defined gesture which when performed saves the transcript and bookmarks the video of the current concept on the screen on Coursera.

Background/Related Work

Once we had the broad problem chalked out, we started by thinking about what kind of insights we wanted to capture from the experiment. The premise we were working with was alleviating breaking the flow of the user while watching a video on Coursera by providing an easier approach to capture important concepts from the video. The hypothesis being gesture-controlled note-taking is cognitively easier than click-to-save notes. Another thing to highlight is Coursera currently doesn't offer the click to save note feature in full-screen mode which we thought would be another value

addition to offer to users. In the subsequent sections, we shall share insights on how we designed our experiment before going into the 1st phase of the user testing.

Understanding User

Our target audience for this feature are students who learn online. The wider audience includes consumers of video content, both synchronous and asynchronous, across platforms such as Zoom, MOOC platforms such as Coursera, YouTube videos. For the scope of the project, we limited our exploration to learners following a MOOC on Coursera.

Currently, users typically make manual notes, capture screenshots, click-to-save notes on Coursera. They don't have the option to save notes in full-screen mode as of now. All the 3 modalities of note-taking mentioned above have one disadvantage, they are all in different places, manual notes are typically in a physical notebook, screenshots are on the user's local disk, and Coursera notes are on Coursera's platform.

Since our experiment was more exploratory, we didn't interview users beforehand, there wasn't a pain point exactly that we were looking to solve but more of an optimisation. We went into the experiment cognisant of the factors in the user's environment.

Prototyping 1

Methodology and process

We decided to set up the experiment as a controlled experiment where we would give 10 users the gesture-controlled note-taking option and the other 10 would have the click-to-save notes option. The objective would be to learn the difference in the experience of the users, any observable difference in the number of notes users from the two groups make. The rationale being if we lower the effort to capture notes, users might make more notes.

The other thing to think about was what gesture/s to offer? Here we chose a scribble like gesture because we thought it would map to the user's mental model of making notes. We thought of introducing another gesture and giving users a choice to observe if there was a greater inclination towards a particular gesture. The other gesture was a hand movement corresponding to highlighting text on a book/paper.

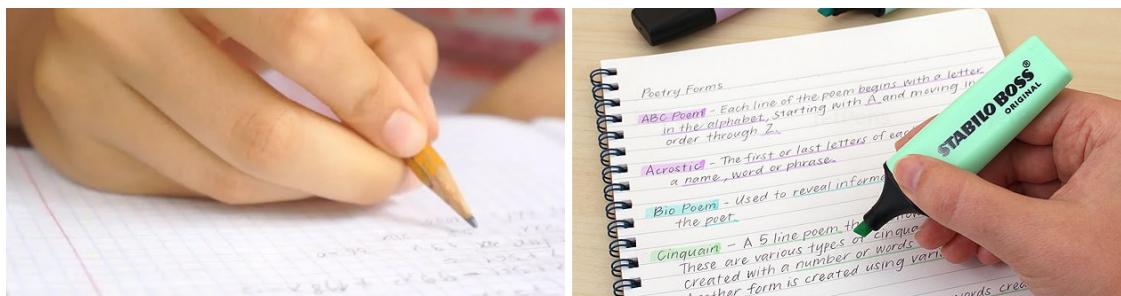


Fig: Our initial choice of gestures was corresponding to the scribble and the highlight gesture

We chose a video on Kubernetes, a moderately advanced computer science concept to show to our users. The reasons guiding this choice include, our audience being students from a tech fellowship. The video was 3.5 mins long making it long enough but not too long, it was moderately challenging and offered ample moments to capture notes.

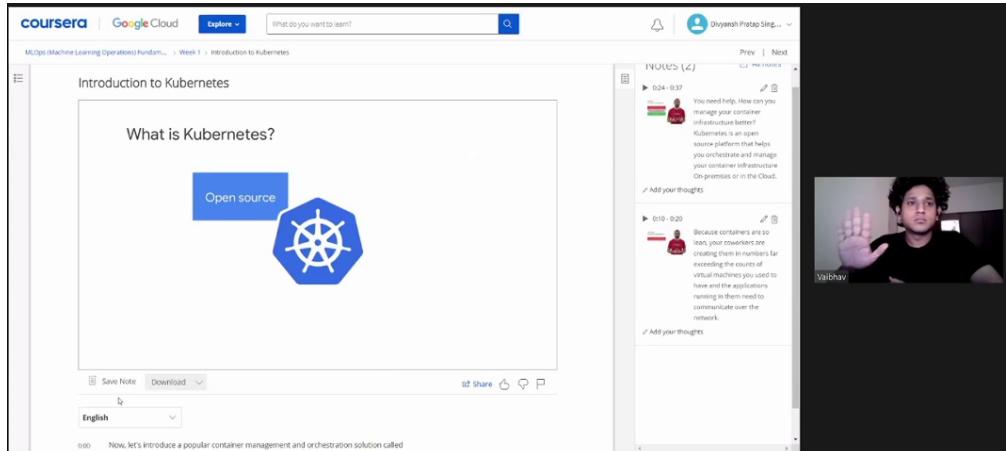


Fig: User testing with a video on Kubernetes

Having these basic parameters in place, we started thinking about how to test with users. We chose a Wizard of Oz approach to simulate the feature experience. The Wizard of Oz method is a process that allows a user to interact with an interface without knowing that the responses are being generated by a human rather than a computer by having someone behind-the-scenes who is doing the task manually. It was the preferred choice over storyboarding and video prototyping as this involved more hands-on experience for the users from which we could potentially obtain more qualitative data. It was executed with the involvement of all three team members. Here's how it would work in our case: we would have the user on a zoom call, we would brief them about the experiment, make them choose a gesture from the 2 choices, and share our screen on which the 3.5 minutes long video would play. We would instruct them to perform the gesture every time they wanted to make a note. As the user would perform the gesture, the experimenter (wizard) would click on the save-note button and to the user, it would appear as if the note got captured when they performed the gesture.

User Testing 1

Methodology

We did a dry run amongst ourselves. Through this, we learned a lot of nuances to simulate the experience better. Even though the experiment seems simple, there are a lot of tasks to be performed in quick succession while being present to the user. It took us around 1.5 hours to arrive at an optimal flow and so we created a checklist of things to do which the experimenter would have to perform. We learned how to phrase things in a way that minimises confusion for the user. Here's our checklist:

1. The experimenter turns their video ON.
2. Brief introduction about the experiment.
3. Explain to the user the task they have to perform.

4. Mention the two gestures and ask the user to make a choice. Capture their choice.
5. Ask users when they are ready to begin.
6. The experimenter shares their screen, turns their video off and mutes themselves.
7. Start the Kubernetes video.
8. Click save note every time the user performs the gesture.
9. Talk to the user about their experience at the end of the video. Capture notes.
10. Capture the number of notes taken by the user.
11. Clear the notes saved to run the experiment with the next user.

At this point, we felt ready for testing with real users. Our control group experiment was pretty straightforward, the experimenter would share their screen and remote control access of their screen with the user. The user would click on the save note button to save a note. The experimenter would capture the number of notes taken by the user and clear them to prepare for the next user.

We maintained an excel spreadsheet for collecting data from the user.

	Gesture/screen	Num of notes	Gesture selected	Liked gesture based note making?	What was difficult with the gesture ba	Anything else you would like to share
ii	Gesture	5 (diff. video)	Highlight	More of a paper-pen note taking person. Wanted to be more of a visual experience. Convenient when someone is talking fast you can have that feel. Mention that how are we doing note taking part.		
	Gesture		10 Highlight	Yes, Effort and not intuitive. Usually takes notes on paper and ; Experience was good but the gesture could be changed. Takes some effort	The part of the video that got captured Only forward or backward what is captured. Go back	
	Gesture		11 Hand up	Don't know what get captured. WHat part of the video. How mu; Easier to do the gesture thing but does no and then take note	Capturing the screenshot would have been easie using the hand gesture. That is a good	

Fig: Capturing data from user tests

After the dry run, we began testing with users over a Zoom call and in-person. We requested user' permission to record them during the test.

User Reactions

1. As the testing progressed so did our briefing for the users. Some parts of our narrative such as choosing a gesture, click-based vs. gesture-controlled note-making confused the users so we started phrasing them differently.
2. Users found the initial gestures, the scribble and the highlight, a little uncomfortable. They expressed concerns like if they are sitting in a library or somewhere outside, they wouldn't want to draw attention to them while performing the gestures. As this started coming from several users, we replaced the scribble gesture with a raise hand gesture. Subsequently, most everybody chose that gesture only.



Fig: A user selecting the raise hand gesture as it was simpler compared to the scribble/highlight.

3. In one of our earlier tests, we didn't mention the duration of the video and observed the user getting a little restless as they didn't know how long the video is and the fact that they are being observed probably made them a little uncomfortable.
4. Most users didn't find a great value add in gesture-controlled note-taking as opposed to click-to-save note feature. Also, in the beginning the questions we were asking them were fairly specific but later upon hearing from one of the TAs we started asking more open-ended questions to the users on how they make notes, what kind of problems do they face, etc.
5. Few users mentioned the essence of writing/typing which reinforces learning was missing in the gesture-controlled note-taking.

Learnings

1. As we deepened in the conversations with our users, we had an aha! moment when a user mentioned in her note-taking process she often captures screenshots and then she has to crop them if she has used the print screen option. Then she has to rename them and organise them. This struck a chord because all three of us take screenshots too, there is currently not an existing feature to take screenshots on Coursera, it is applicable not just on Coursera but on other platforms such as Zoom as well. We also spoke that screenshots are a lot more accessible and faster to consume as compared to videos and text.
2. A complete change in the way of note-taking was not really needed by many users.
3. Users prefer simple gestures. Even though the hand gesture was preferred we felt its natural mapping is to play/pause kind of action. So instead of the hand gesture, going forth we decided to stick with a snip like gesture with the index finger and thumb coming together and the rest of the fingers folded in a relaxed position. This is something that's simple as our users asked for and maps to the correct mental model of taking a screenshot/snapshot.



Fig: (Left)Raise hand gesture (Right)Snip like gesture for capturing a screenshot

4. The duration of a run was turning out to be way longer than we had planned, ~20 mins as compared to 6-7 mins, plus we started hearing recurring points from the users. At this point, we decided to stop the experiment and pivot our feature from gesture-controlled note-taking to gesture-controlled screen-capturing after testing with 5 users.
5. Since we pivoted, this is now an inconsequential data point, but on average users took around 10 notes while using gestures-controlled note-making.
6. We learned several of our assumptions about the user' preferences and mental model were faulty such as the difficulty level of the Kubernetes video was actually higher.



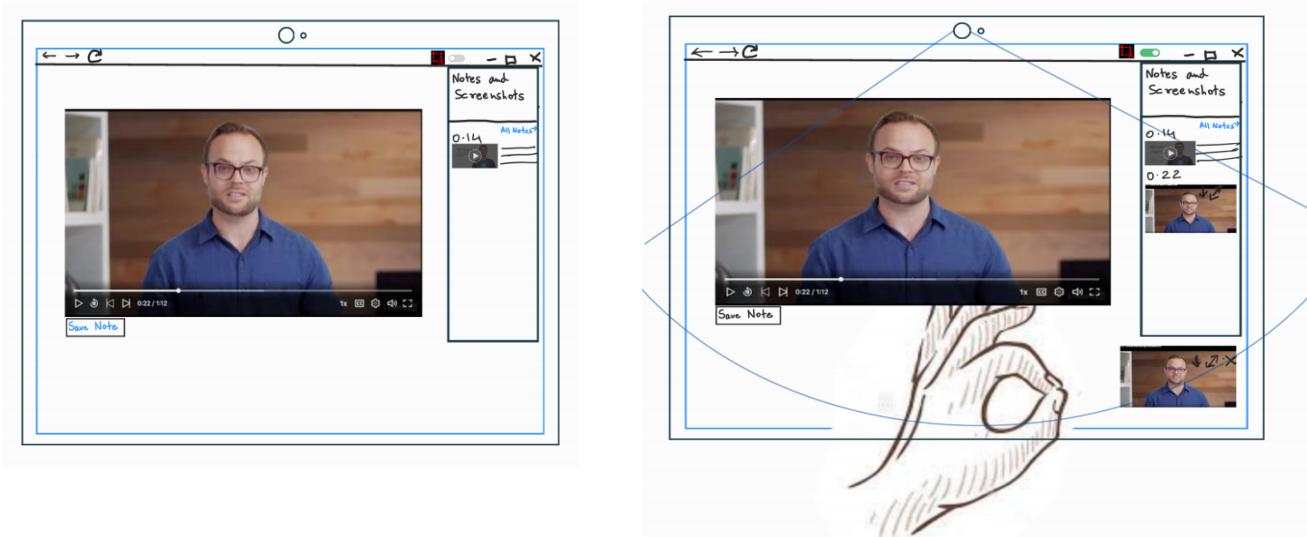
Fig: Briefing a user on our Wizard of Oz experiment.

Prototyping 2

Methodology and process

The feature we were now trying to incorporate was a gesture-controlled screen-capture. Since this wasn't an existing feature on Coursera, we had to develop some screens as to how the feature would integrate with the existing user flow so we created a sketch laying out the basic idea of the screens. We drew it on Samsung Notes using a stylus pen. We were integrating our feature on the Coursera website, so we knew the basic structure and tried incorporating our design without changing the look and feel of the website. We tried exploring how we would show the user that the capturing screenshot was successful. Below are the granular points of our methodology:

1. Discoverability: How will the user know that they can take a screenshot now.
2. Control:
 - a. When does the user have access to this feature? This feature was accessible only while watching a video.
 - b. Can the user manually turn off the feature when not needed? There's a toggle button next to the screenshot icon to turn on/off the feature.
 - c. What can a user do once the screenshot is captured? We decided to put the icons on the thumbnail to download, expand or delete the captured screenshot.



3. Ease of use: Screenshots were saved with timestamps so the order can be maintained. Users can click on All notes link to view all notes and screenshots.
4. Incorporating user's insights from Prototype1 user testing: No need for the user to snip the image to remove junk things from the screenshot. Only taking screenshots of the video.
5. Added Feature: Giving space for the user to write their own notes corresponding to the screenshot.
6. Allowing users to download the screenshot along with their written notes.

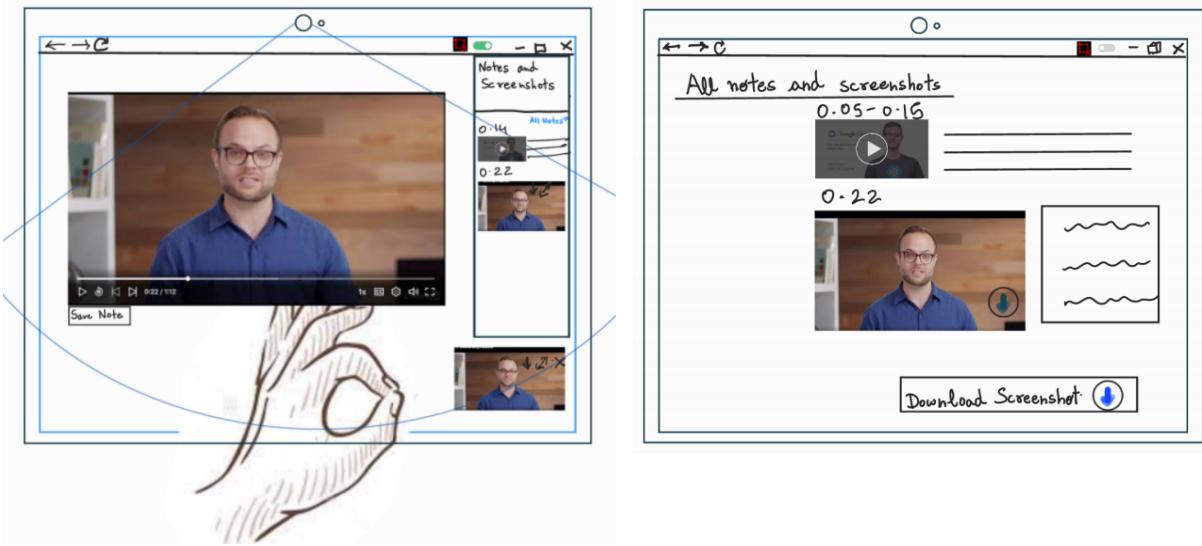


Fig: Storyboards of our prototype

User Testing 2

Methodology

After prototyping based on the user and team's feedback we conducted another user test with one of the members from our previous batch of user-testing. One of us was on a Zoom call while the rest of the team was with the user, presenting the screen so that the other team members could also observe the user and follow up on the nuances.

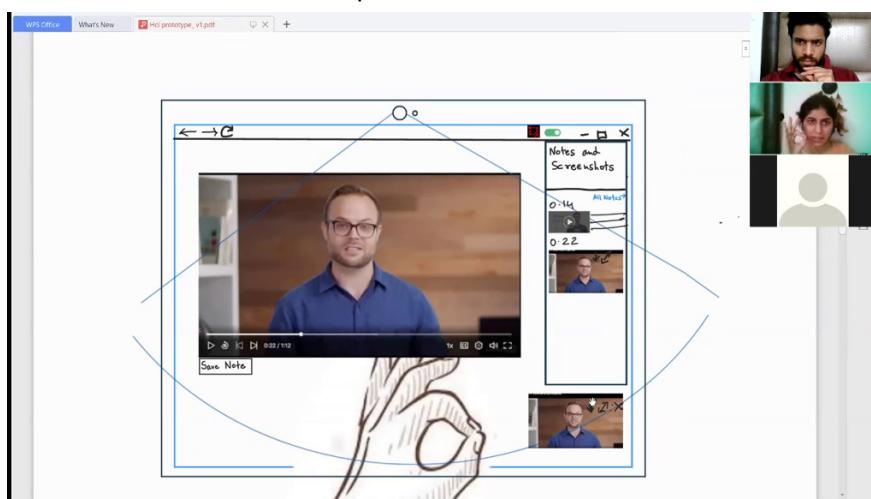


Fig: User testing iteration 2 on the storyboard

We chose to go with storyboarding and encouraged the user to think out loud. We briefed her about the process and mentioned to her to not feel reluctant in sharing by stating we are also still figuring this out. The user spoke about the way the interface was constructed, they expressed their ease and difficulty in understanding/identifying few elements of the screens. Some of those points are shared below.

User Reactions

1. The user was not able to understand the gesture capture icon.
2. The user was not able to understand the download icon on the screenshot.
3. The user was able to understand the screenshot image that served as a feedback.
4. The user was able to understand the type of gesture needed to capture the screenshot.
5. The user found the functionality of screen capture and it being all properly organised, in the all notes section, useful.

Learnings

1. Few of the icons were not a standard choice and hence the user was confused, we took this into account for the next iteration of the prototype.
2. The use case was validated as the user herself defended the feature as one of the members tried playing devil. We would have ideally liked to test with more users but were not able to because of the constraint of time.
3. The think out loud approach of user testing worked quite well.

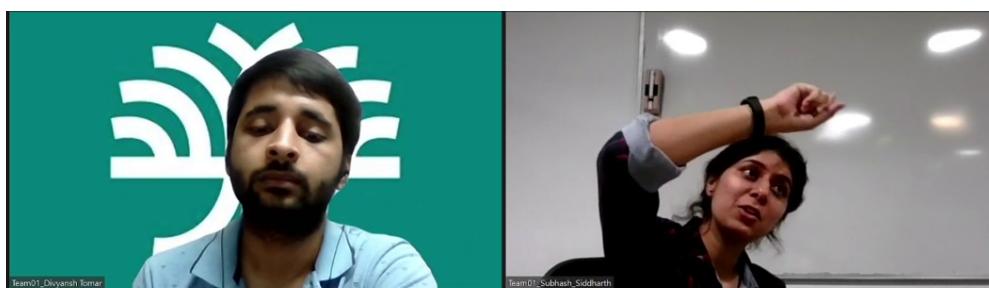


Fig: Thinking out loud with the user

Prototyping 3

Methodology and process

In this prototype we incorporated the user feedback and made further improvements. This prototype is also made using Samsung notes on a tablet using a stylus pen. We did not choose Balsamiq as Samsung notes gave us more freedom to experiment. Below are the changes made in this iteration:

1. Made the webcam dark in colour so it gets some contrast.
2. Changed the screenshot icon to a different one which is better understandable by the user.
3. Added the coursera icon so the user gets to know that this feature is there only for Coursera.
4. Made icons on the thumbnails more interpretable and apparent.

5. Added feature from user insights: To make note taking more organized and simple, giving a feature to download all screenshots taken by the user for a particular course. All screenshots get downloaded along with notes in the form of a PDF to the local machine with the file name as course name.

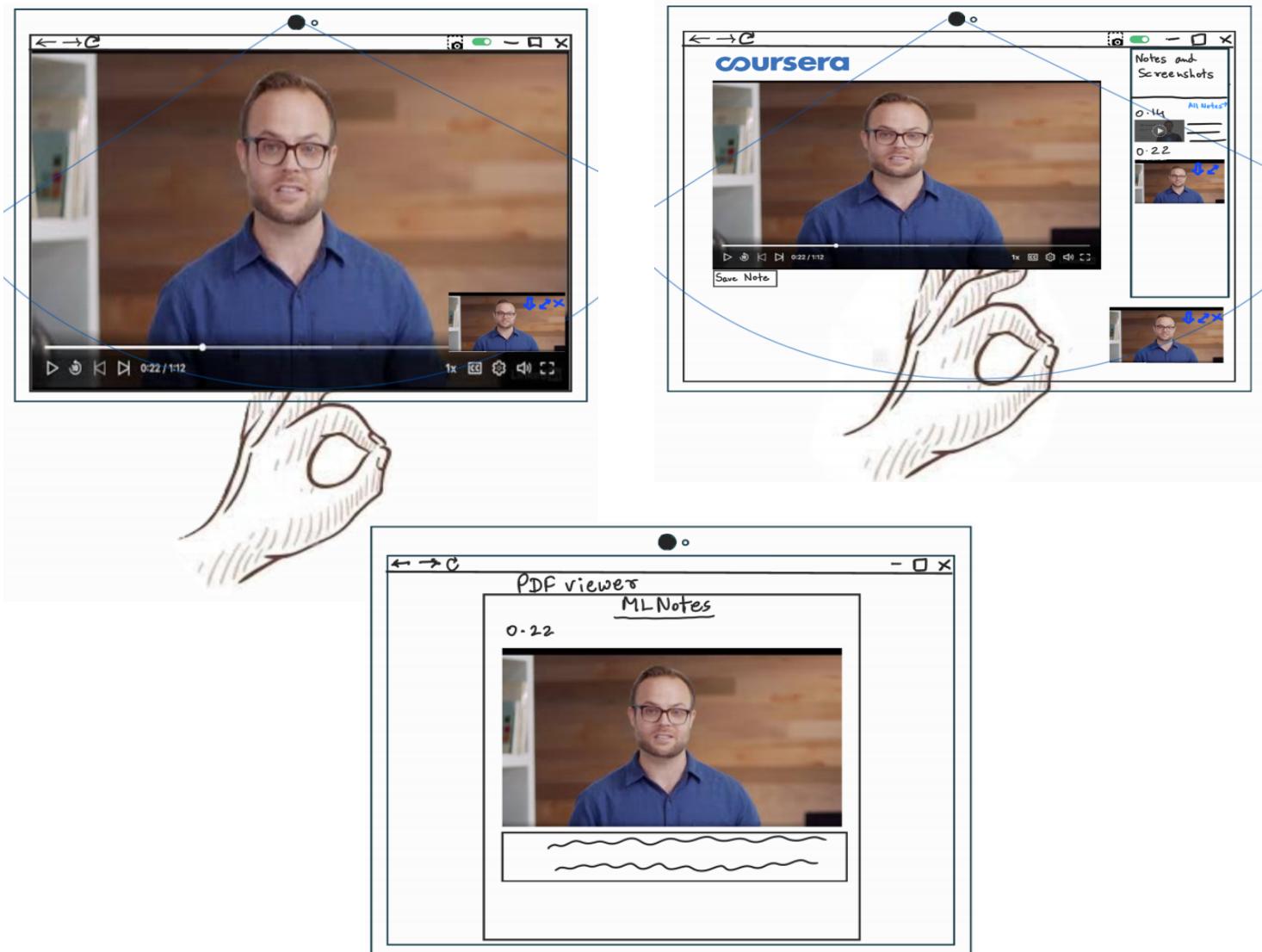
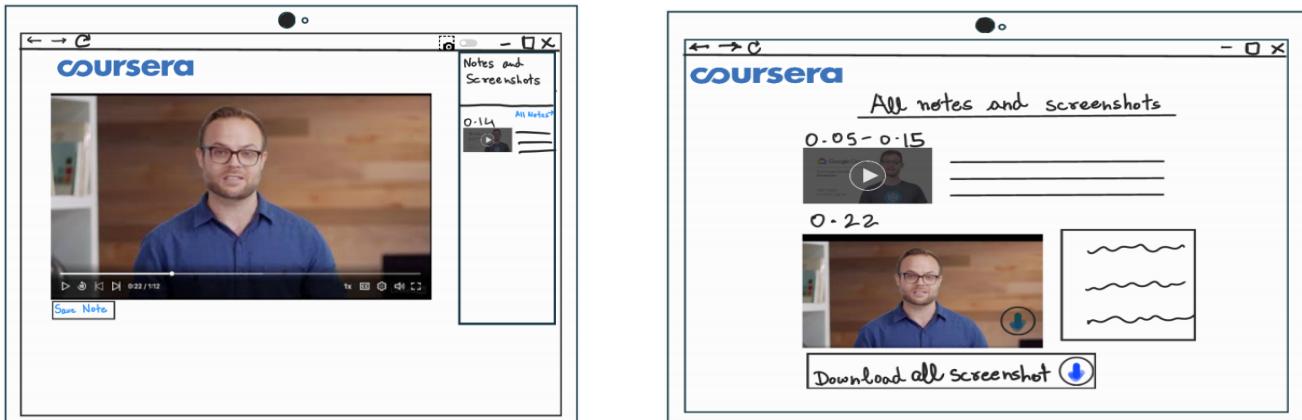


Fig: Storyboards after user testing 2

Conclusion

This was a great project since we got the opportunity to actually test things out with users which hasn't been the case in most other such projects and courses we have taken so far during our time at the Plaksha Tech Leaders Fellowship. We realised the value in learning from user testing with the help of quick basic prototypes, the iterations were fast and quickly proved many of our assumptions faulty. We would have ideally liked to test with a bigger user base but had to work with time and resource constraints. Through the process, we feel we haven't yet arrived at a fully desirable or useful outcome but the delta from where we started is evident. We had a great deal of stimulating and engaging conversations while designing our Wizard of Oz experiment, actually testing out with users, hearing their feedback, refining our experiment on the go, having discussions on the prototypes, doing rounds of feedback as a team, etc.

Working in teams and having to collaborate with each other in an already pressured environment was another important learning experience we are taking from the course. Overall we had great communication as a team, we got a glimpse into building things in real life as a team. Creating this report was also a good exercise at culminating and synthesising our learnings from the whole exercise of choosing an idea to prototyping it and testing it out.

We're grateful to the program team at Plaksha for including this valuable course in our curriculum. Even though online, it felt engaging. It's one of the few courses where a lot of the focus is on meta-learning, and irrespective of what different people from our diverse batch choose to do, it will be helpful for everyone. To our HCI faculty, Dr. Sudheendra Hangal, for guiding us in a fun, patient, kind, and insightful way through the process, for listening to our problems and for helping us find clarity. To our fantastic TAs for the course, Vaibhav and Urvin, who were always a text away, very responsive and knowledgeable about the subject, they truly did a great job assisting us in our learning journey.

Team



Fig: Top left - Divyansh (the Wizard), Top right - Subhash, Bottom - Siddharth

Shared

Designing and refining the experiment. Report writing. Presentation. Engaging with users in user feedback.

Divyansh

Took lead in designing and developing the storyboards in an interactive fashion and played the wizard in the Wizard of Oz.

Siddharth Jain

Planning and managing the project, coordinating meetings and communication, rounds of feedback on the prototypes. Review and edit the report.

Subhash

Came up with the gesture-controlled note-taking idea. Documented the experiment. Actively attended office hours to get clarity on the direction to take in the project.

Gallery

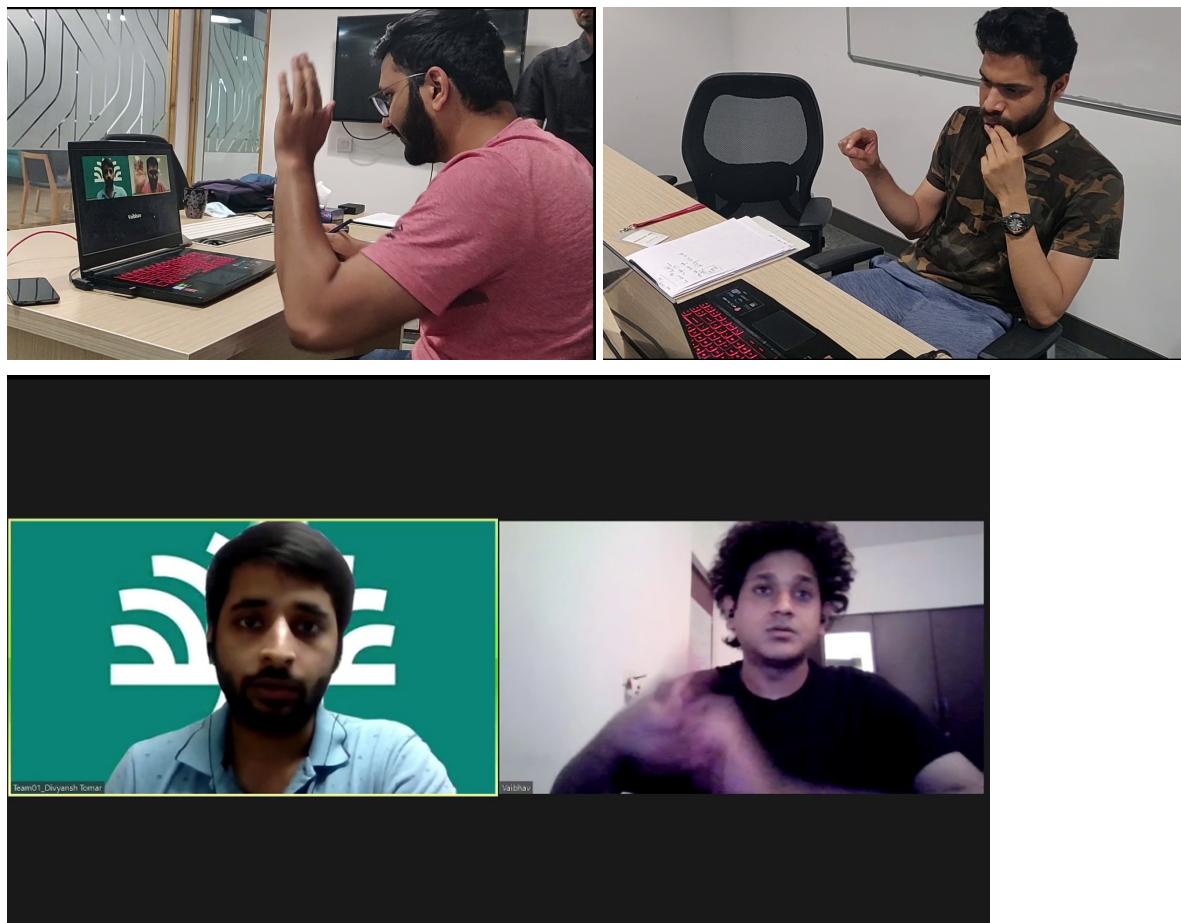


Fig: Moments from user testing