

Software Engineering
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Prototyping Techniques

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Recap

- Goals and principles to design “usable” interfaces

- Process of interaction design -
 - Identifying needs and requirements
 - Developing alternative design that meet those requirements
 - Build interactive versions
 - Evaluate



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In the previous video, we looked at goals and principles to design usable interfaces. So, usable interfaces referred to interfaces that are effective, efficient, learnable, memorable and safe. And they also ensure that users have positive experiences while using these interfaces. So, keeping these goals and principles in mind, we can now start building interfaces which implement the user stories and requirements.

And also recall that the process of interaction design, it involves first identifying the needs and requirements. Then we develop alternative designs that meet those requirements. Then we build interactive versions of these designs. And finally, we evaluate the user interface.

So, now let us say we have identified the needs and requirements. And we know what the goals are, which we need to keep in mind while building such systems. So, now we can proceed to the second step of developing alternative designs and building interactive versions of the user interface. But how do we do this? Can we directly jump and write code? Do you think that is a good idea?

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Reflection Spot

Are we ready to code? Why shouldn't we code the UI right away?



Please pause the video and written down your responses



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So, let us reflect on this question. Are we ready to code once we know the needs and the requirements? Can we code the UI right away? What are some reasons for not doing so? You can pause this video and think of some reasons before proceeding.

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Why we shouldn't start coding

- Initial design ideas might not be the best ones
- Developing an interface takes time, money, effort
- Prototypes allow you to quickly test on users, get feedback, iterate, and pivot



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So, what are some reasons for why we shouldn't start coding right away? One is that the initial design ideas it might not be the best ones. So, users may not like certain aspects of the initial UI. Second, developing a user interface writing code it takes time, it takes money and effort. And if the users do not like the first version, then we have to go back and write code

and redesign the entire user interface from scratch. So, the solution for this is to develop prototypes. So, prototypes allow you to quickly test on users, get some feedback and iterate.

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Prototyping

- Prototypes answer questions and support designers in choosing between alternatives.
- Purpose -
 - Test out technical feasibility of an idea
 - Clarify some vague requirements
 - User testing and evaluation



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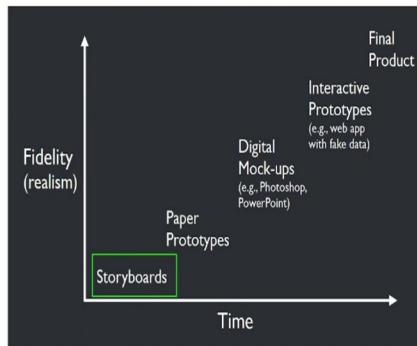


So, prototypes, it helps us answer questions and also support designers in choosing between different alternatives. So, what are the purposes of prototyping? It helps us test out the technical feasibility of an idea. So, some aspects of the user interface might not be very clear at the start. And also, we might have some very vague requirements.

So, once we build a simple prototype and show it to users, then they might give us feedback and it will help us clarify these vague requirements as well. And prototyping is also useful for user testing and evaluating our initial prototypes or initial user interfaces. So, prototypes help us to build something quickly and get feedback quickly.

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Types of Prototypes



Taken from Prof. Philip Guo's Intro to HCI course - <http://cs156.ics.uci.edu/home/f16/lectures/IntroHCI-f16-Week2.pdf>



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So, now, let us look at different types of prototypes. So, we can develop different types of prototypes based on the purpose and the time of development and also the fidelity. So, fidelity refers to how real the interfaces compare to the final product.

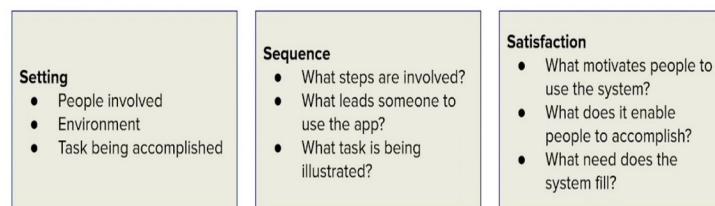
So, in this graph you can see that storyboards and paper prototypes, they are developed initially and they do not resemble the final product that much, but as you move towards the right, top right you see that digital mock-ups and interactive prototypes move closer to the final product which we want to build.

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Storyboard

A hand-drawn comic that features:

Setting + Sequence + Satisfaction



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So, now let us look at what storyboards are. So, storyboard is nothing but a hand-drawn comic that features three important elements. One is the setting, second, the sequence of

activities in the task, and finally, some satisfaction which the user receives. So, setting refers to the context in which the system, the software or the app will be used. For example, who all other people involved? What is the environment? What is the task which needs to be accomplished?

And the second aspect is the sequence. So, what steps are involved? And what is the task? And how is it being illustrated? All that comes in the sequence. And finally the satisfaction. So, what motivates people to use the system? What sense of accomplishment do they get after using the system? And what need does the system fill? So, this also has to be mentioned in the storyboard.

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Storyboard example

Speak-Up - Virtual reality tool to help give effective presentations

- Simulate a presentation setting
- Recording of audio during the presentation
- Hints are provided during the presentation process

Taken from Introduction to Human Computer Interaction course - Prof. Chandan Dasgupta - IIT Bombay
Team members - Nagesh Pokle, Deepika Kanojia, Vishwanath Falegaonkar, Dr. Veenita Shah

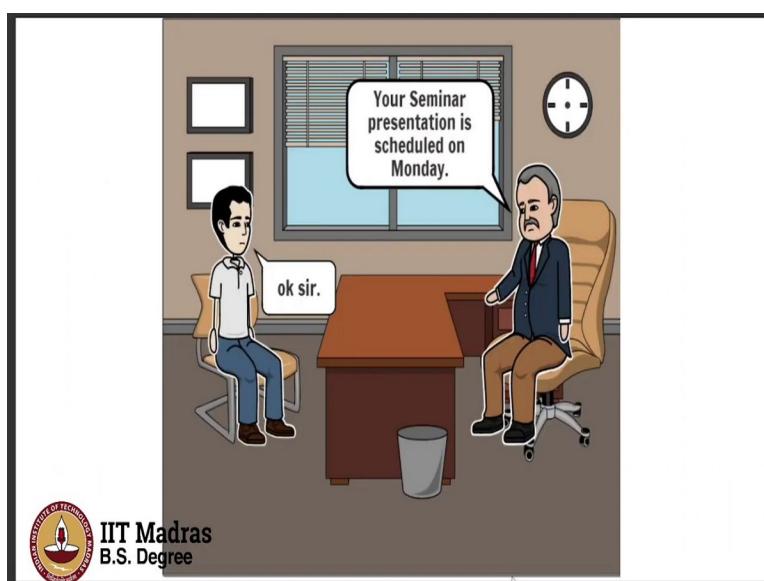


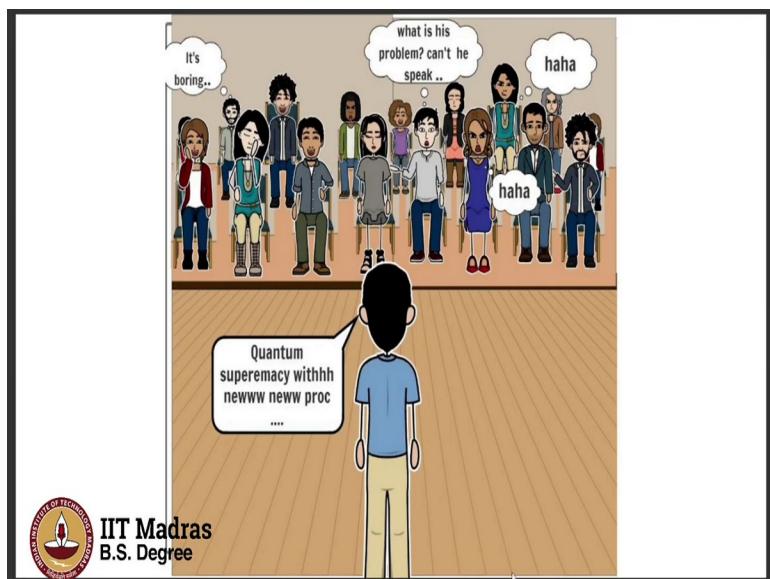
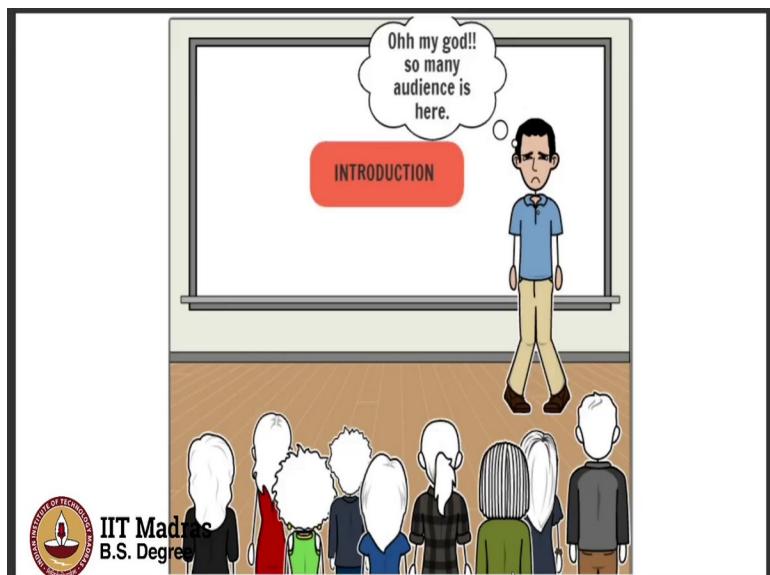
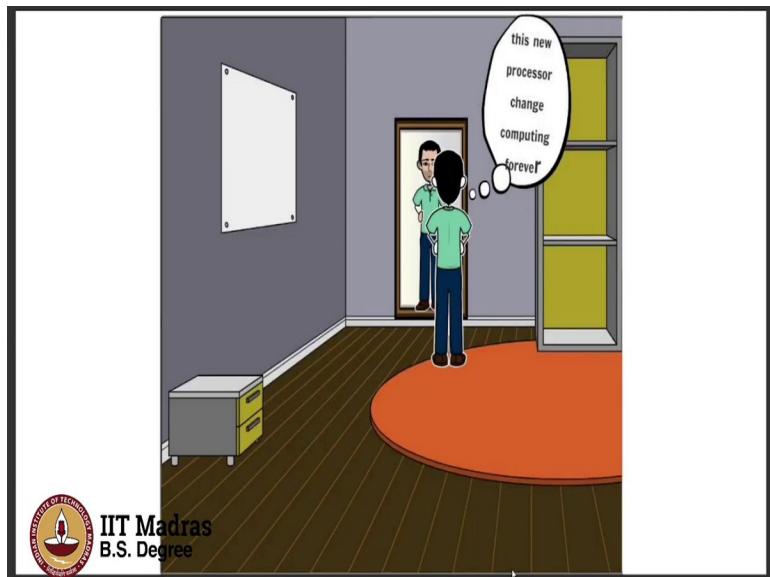
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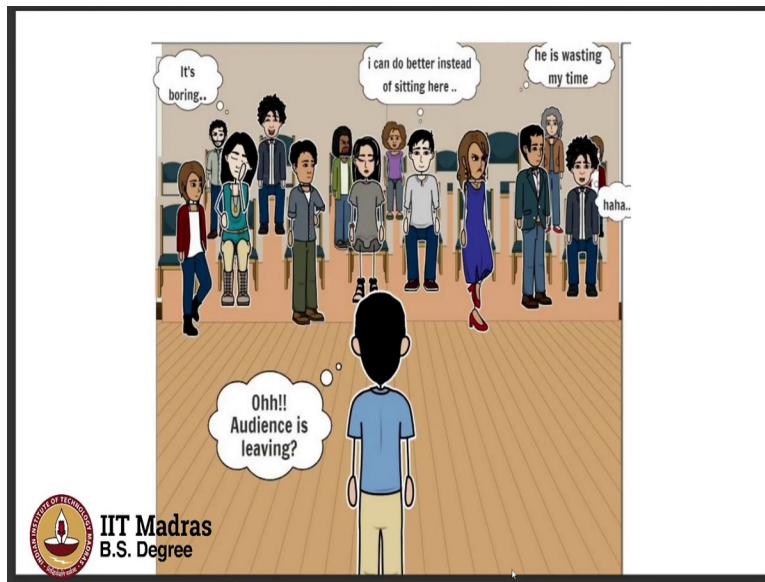


So, let us take an example of a storyboard. So, we will be looking at an application known as speak-up. So, speak-up is a virtual reality tool, which can be used to give effective presentations. So, let us say we want to give a presentation in front of a large audience. So, before we give the actual presentation, we can use speak-up which is a VR application that simulates a presentation setting for us, we can record our audio, and hints are provided, and all of these features are present in this tool. So, let us see how we can create a storyboard for such a tool.

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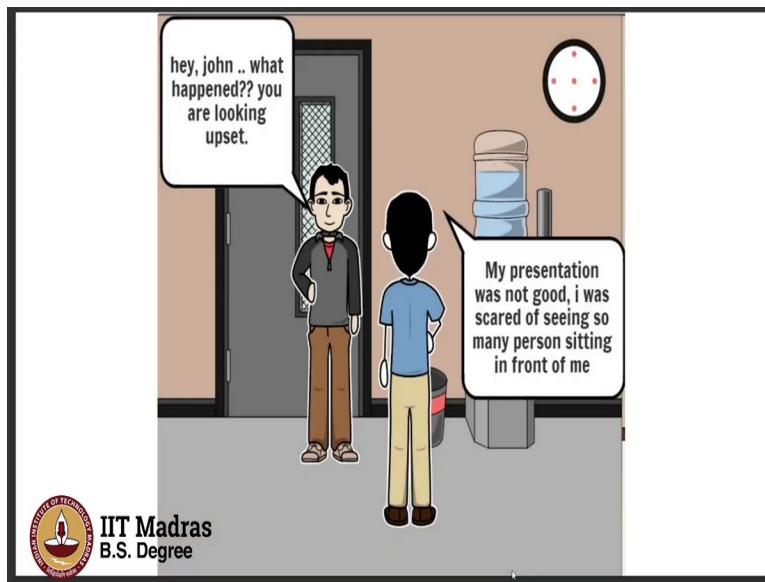


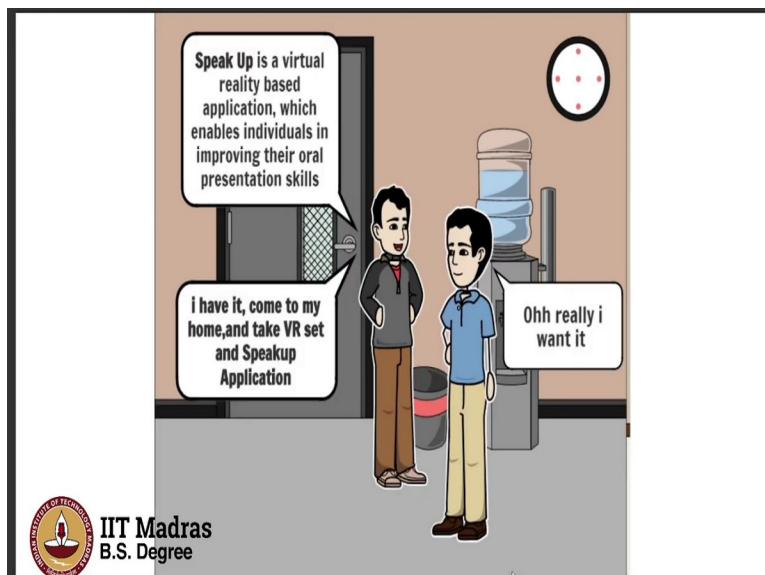
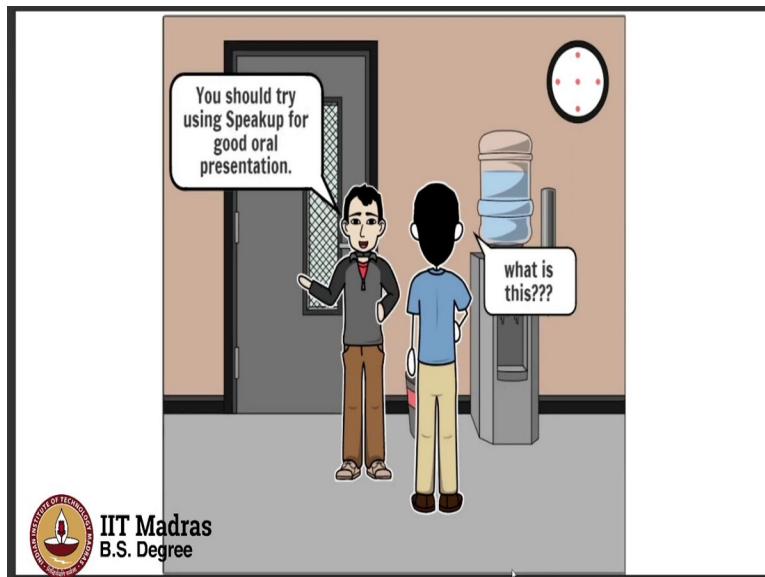




So, now let us look at the storyboard for the speak-up VR application. So, recall that the first step in storyboarding is to develop the setting. So, who are the people involved? What is the environment? And what is the task which has to be accomplished? So, here you can see that a person he has to give a presentation on Monday, and he is practicing in front of a mirror. But on the day of the presentation, he is nervous, and he is not able to give the presentation well. So, we see who are the people involved, what is the environment and what is the task, the task is to give an effective presentation.

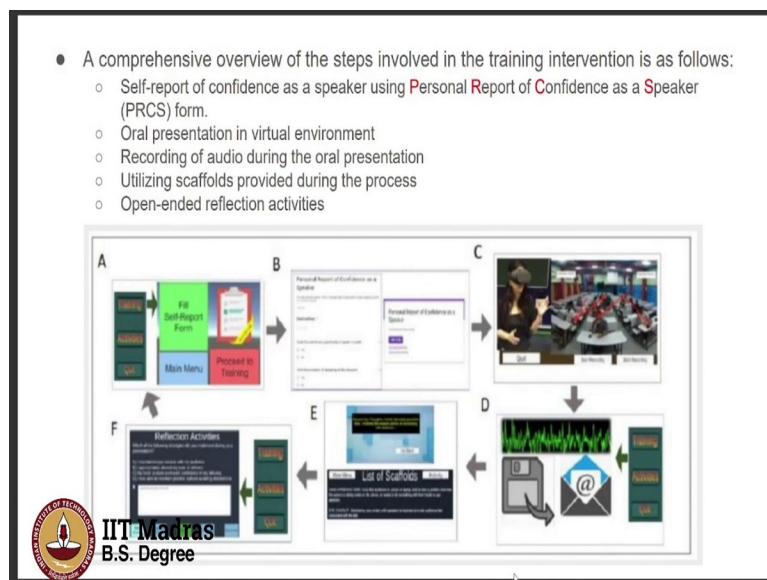
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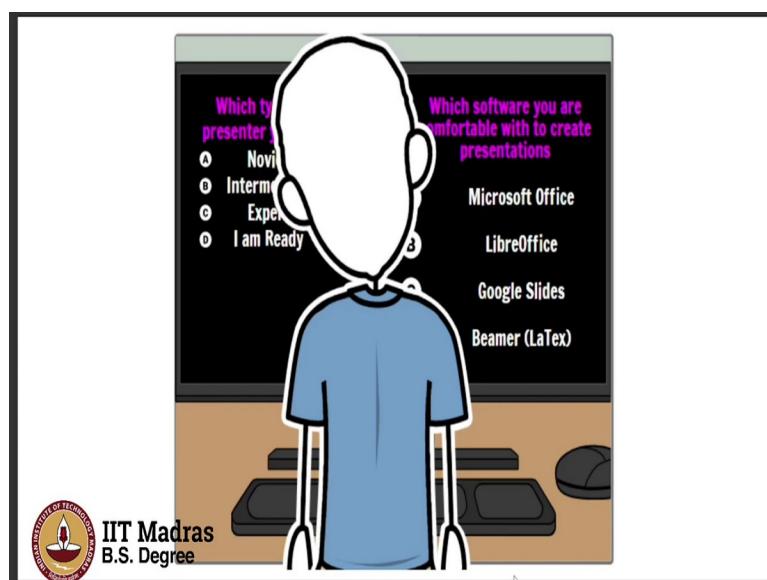
Now, that the setting has been established. Now, the second step is the sequence or what are the steps or what is the task, which the software system helps the user to do. So, here you see that a friend recommends speak up to this person.

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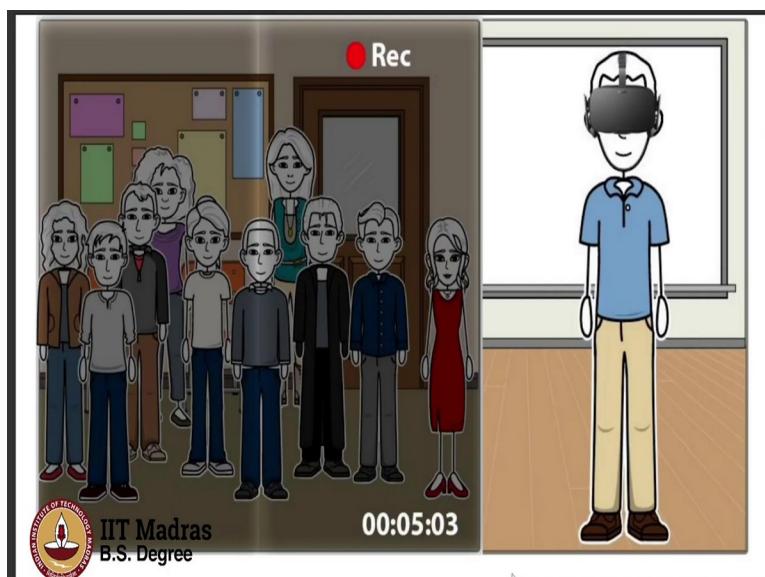
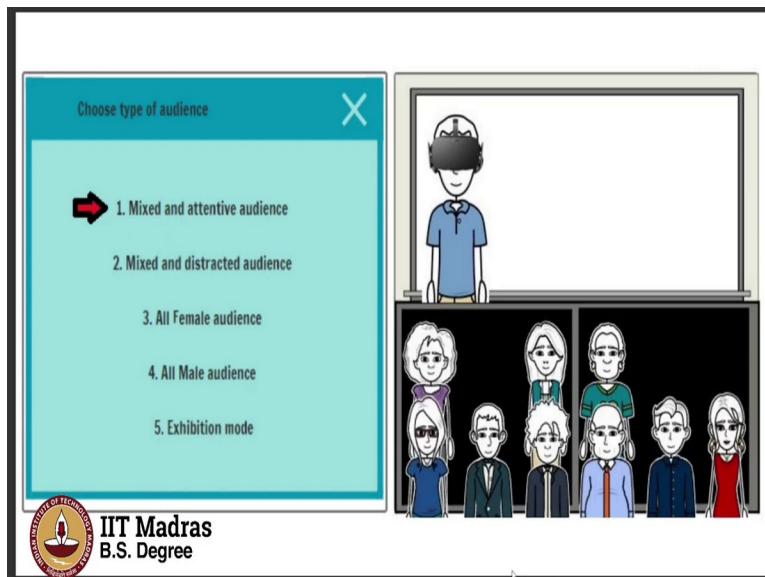
And talks about what all are the features in speak up.

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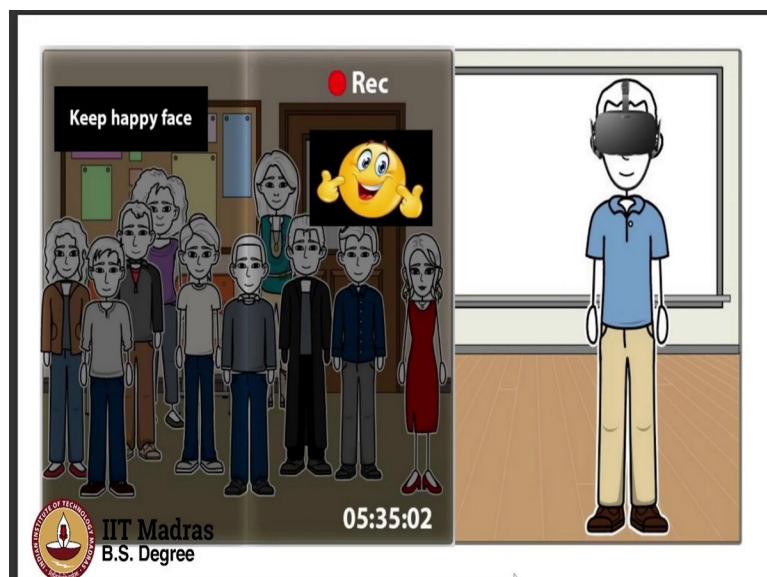
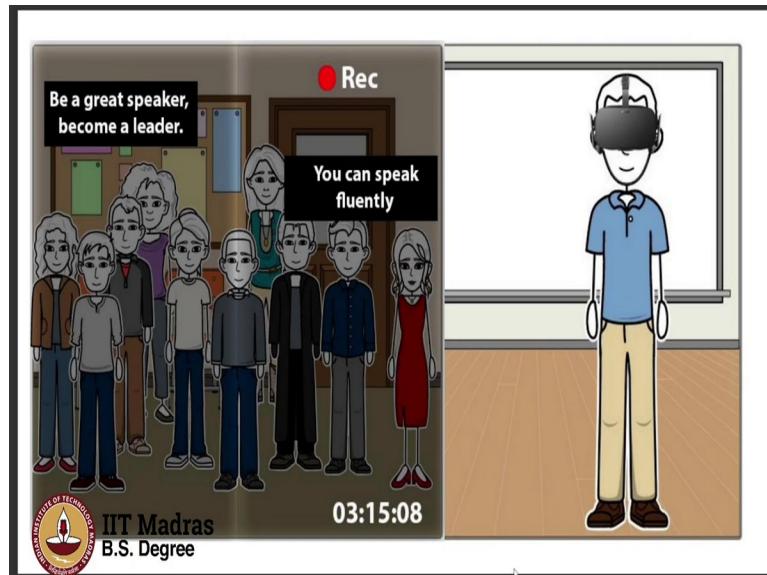
And here we see that the user starts using speak up.

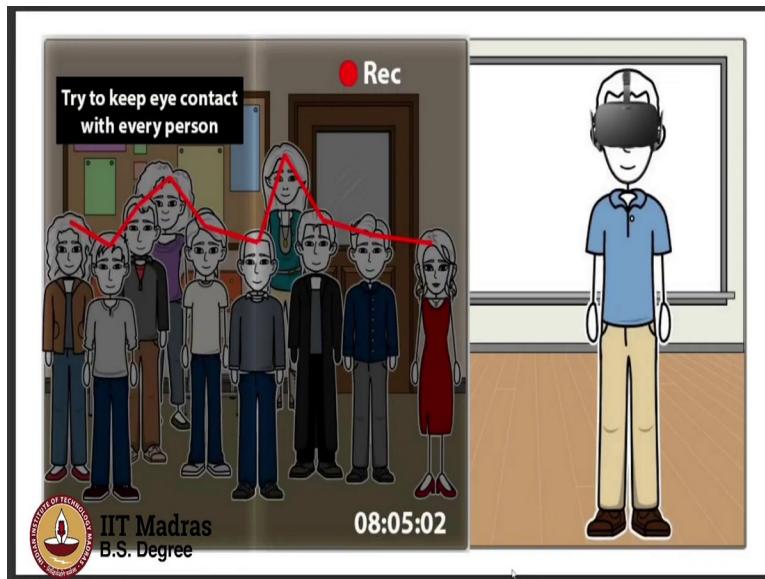
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So, he can choose the type of audience and he can start recording his audio.

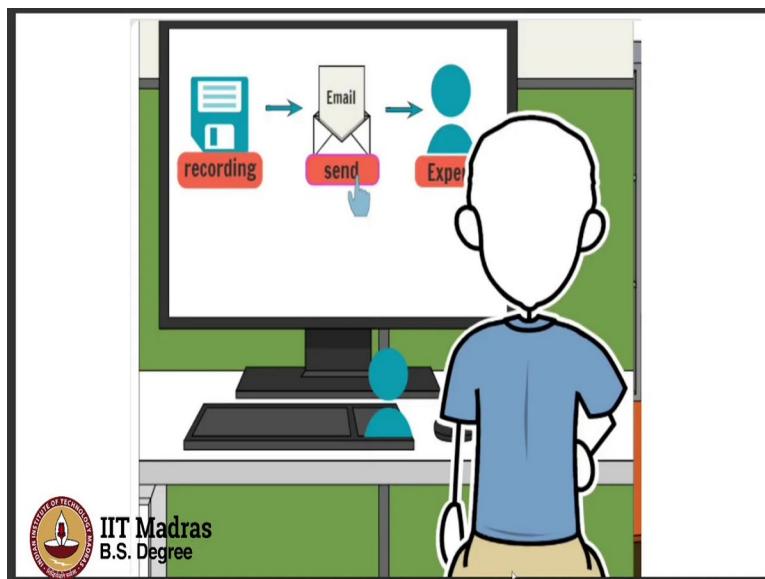
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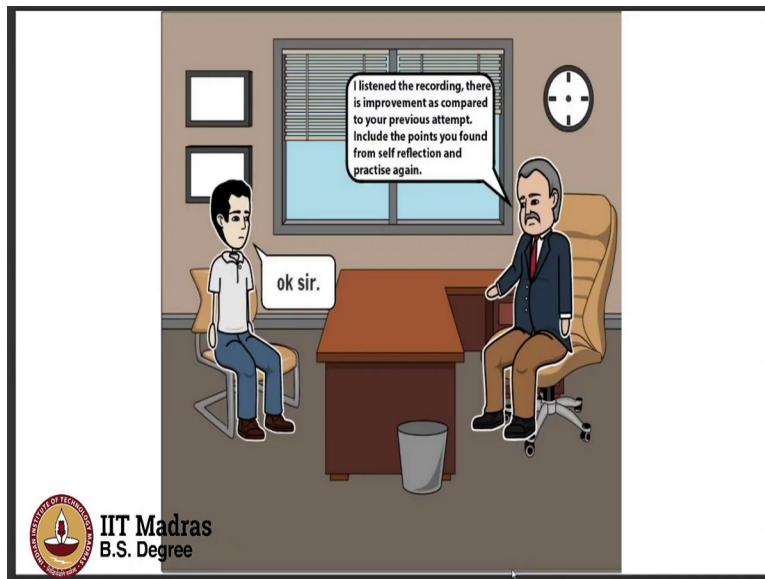




We see that the system gives feedback, gives comments.

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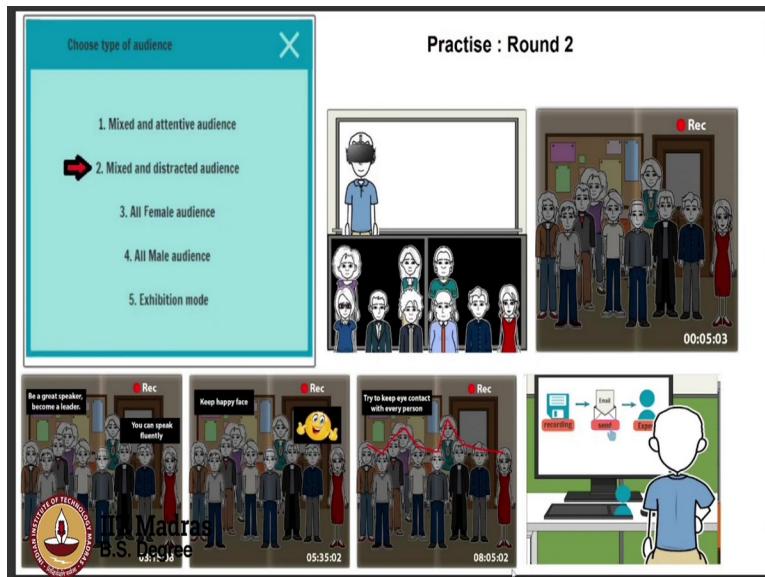


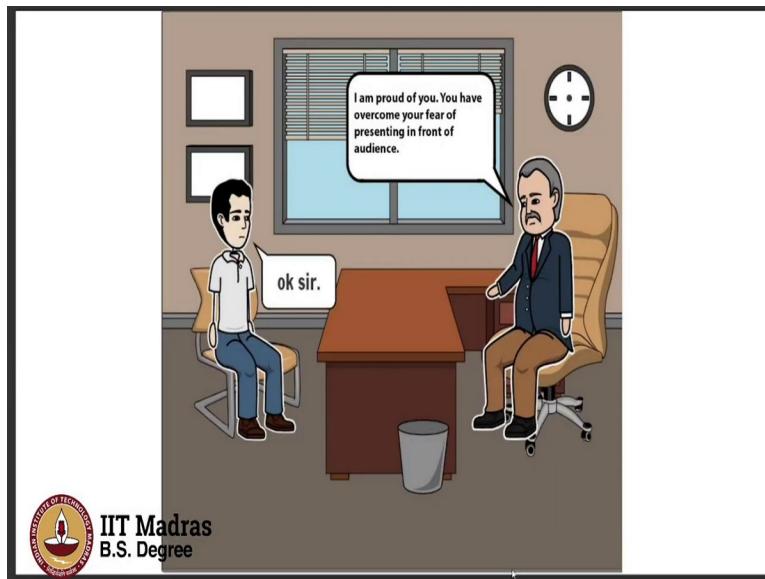


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The user can send the recording of his presentation to his mentor.

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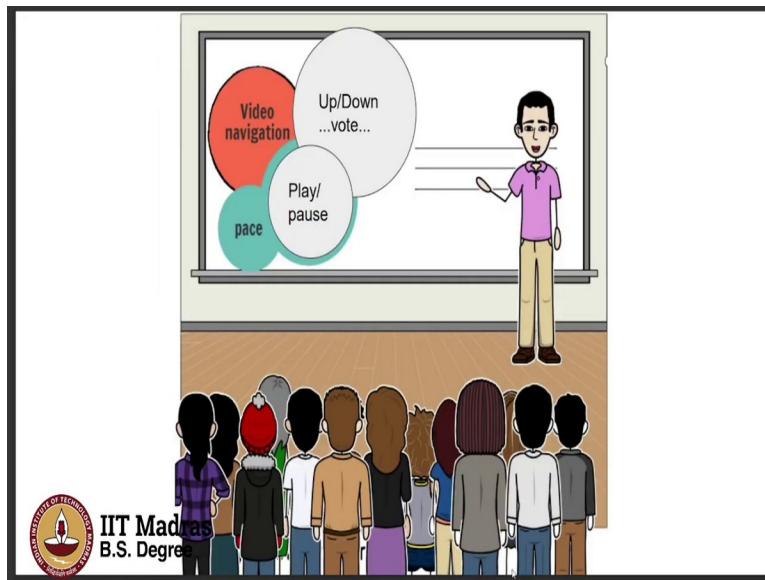




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And there is the second round of practice. So, in all of these, we see that the steps which are involved are clearly defined what is the task all that has been clearly defined in the storyboard.

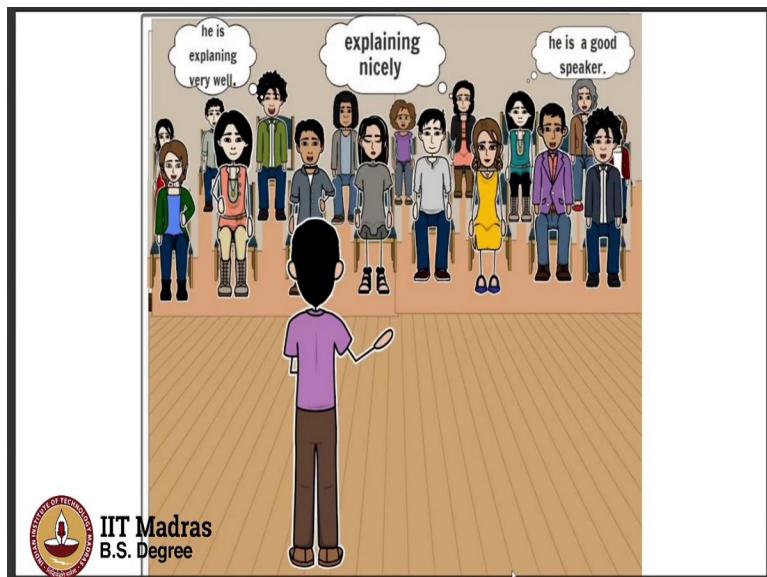
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And finally, we see that this person presents effectively in front of an audience.

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And this brings us to the third part of story boarding which is the satisfaction. What motivates people to use the system? Or what is the sense of accomplishment that this person receives after using the system. So, here we can see that this person becomes confident, he can effectively give a presentation in front of a large audience.

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Benefits of Storyboard

- Emphasizes how interface accomplishes a task
- Avoids commitment to a particular user interface
- Shared understanding among stakeholders



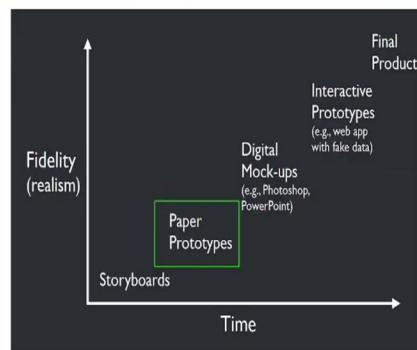
Now, that we have seen an example of a storyboard, let us look at what are its benefits? One is that the storyboard gives us a holistic focus. It emphasizes how the interface accomplishes a task without giving specific details about it. Also, it avoids commitment to a particular user

interface. So, in the case of the speak-up storyboard, you might have noticed that no user interface or none of the features were actually developed.

And finally, it helps develop a shared understanding among the different stakeholders. So, this ensures that all the stakeholders are on the same page in terms of the goals of the software system which we want to build.

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Types of Prototypes



Taken from Prof. Philip Guo's Intro to HCI course - <https://ixd.ucsd.edu/home/f16/lectures/IntroHCI-f16-Week2.pdf>



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So, we looked at storyboards. Another type of prototypes is to use paper prototypes.

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Paper Prototypes

- Hand-drawn interface
- Multiple pieces of paper



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So, paper prototypes are simple. It is a hand-drawn user interface. And we usually use multiple pieces of paper to actually draw the UI of different screens.

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Paper Prototypes Example

Online Library for Deaf and Hard of Hearing (DHH) and Speech Impaired Students

- Books in Indian Sign Language (ISL)
- Speech Therapy

Taken from Introduction to Human Computer Interaction course - Prof. Chandan Dasgupta - IIT Bombay
Team members - Meera Daulatram Pawar, Jyoti Kolap, Nisumba Soodhani K, Vijaya Singh, Devanshu Saindane

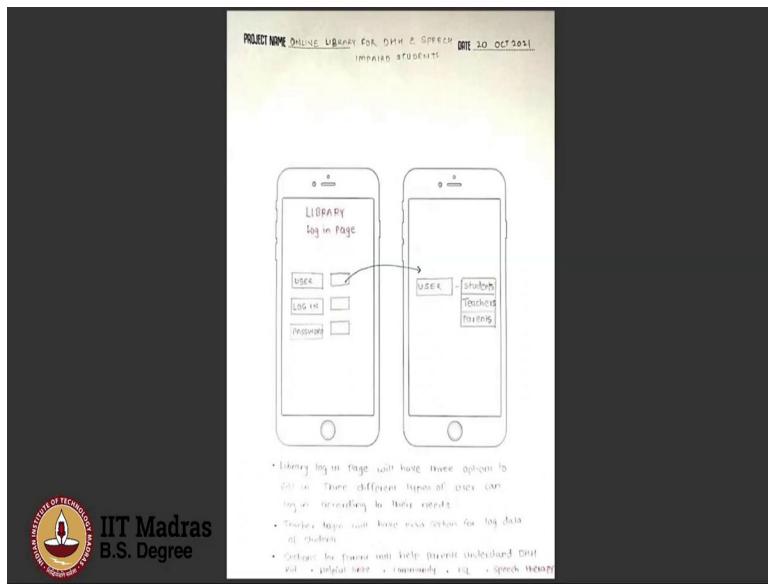


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So, let us look at an example. So, this is an example of an online library system for the deaf and hard of hearing or the DHH and speech impaired students. So, it has several features such as books are provided in Indian sign language, there are options for speech therapy, etc. So, let us look at how we can develop a paper prototype for this application.

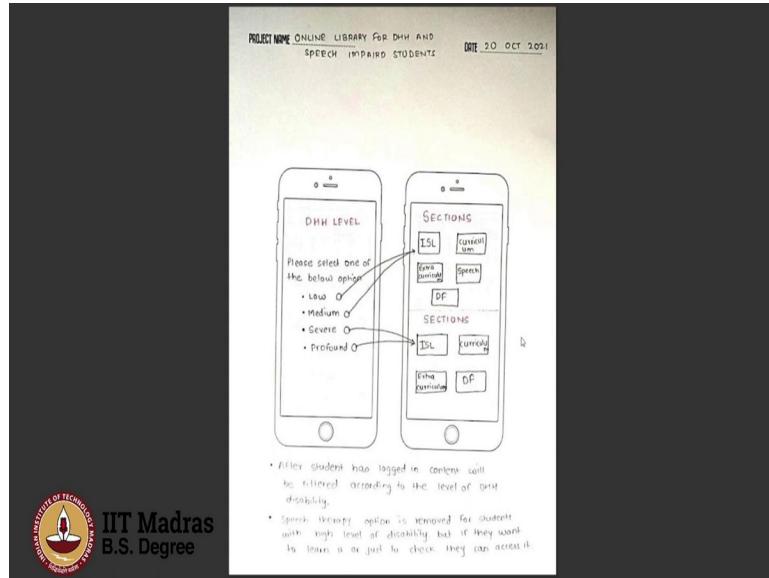
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So, this is a prototype for an online library for DHH and speech impaired students. So, as we mentioned in the paper prototype, the different screens of the UI or all the elements of the UI are drawn on a piece of paper. So, here you can see that the first screen which a user encounters is the login screen.

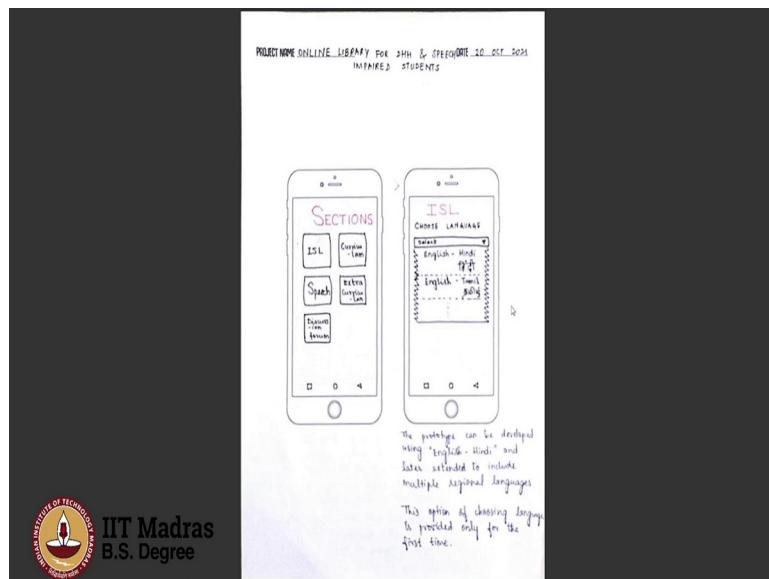
And when the user clicks on a particular link, or button, what is the next screen which appears that is being shown. For example, user can be a student, teacher or a parent. So, the appropriate user can click on the particular button.

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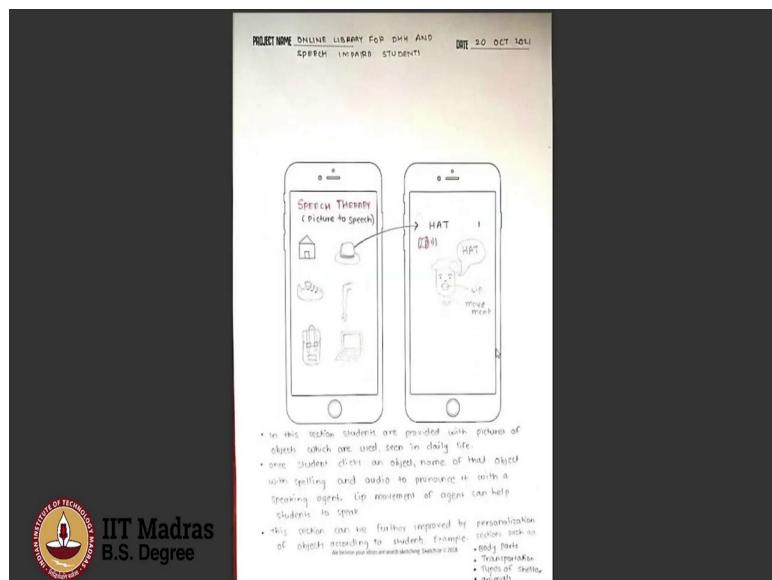
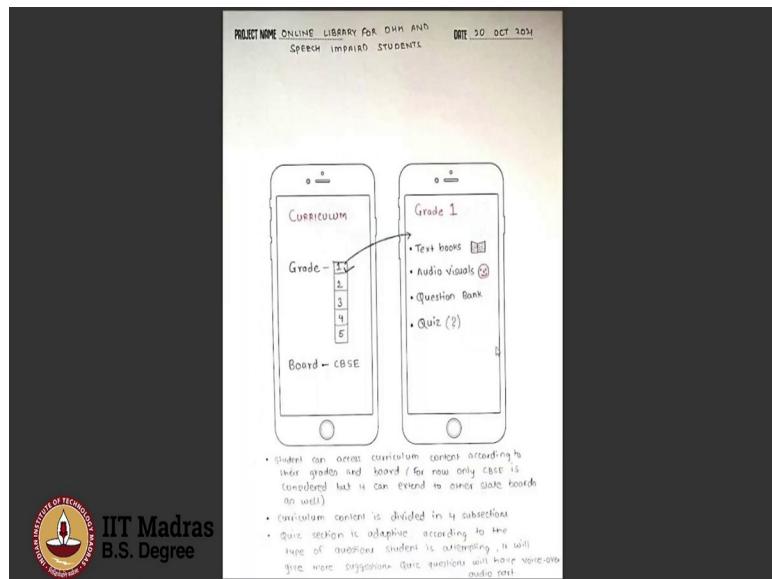
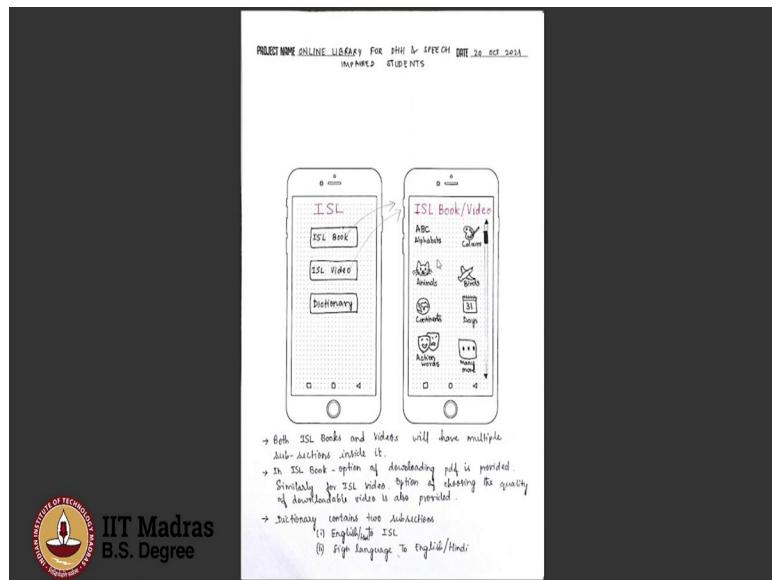
And then it proceeds to show the options for different screens. So, if I click on a particular option, what is the next screen which appears that is being shown.

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And this process continues for all the screens in the application. For example, here when I choose ISL, which stands for Indian Sign Language, then there is a drop down in which I can choose the language which I want to see it in.

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And for each option, what are the different screens which are visible to me that is being shown.

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Benefits of Paper Prototypes

- Easier than writing code for user interface
- Starts conversation about user interactions
- Elements can be changed immediately based on given feedback

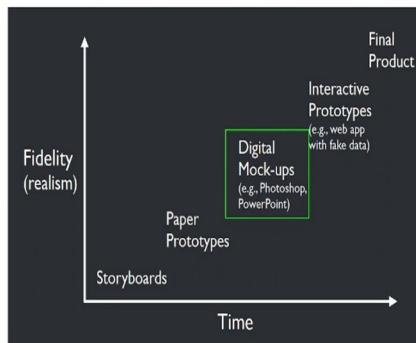


So, let us look at some benefits of these paper prototypes. One is that it is much easier than writing code for the actual user interface. Developing these paper prototypes involves just drawing something on a piece of paper, drawing the different screens, and hence it is much easier than writing code.

And with paper prototypes, you can start conversations about user interactions. As we saw that it gives us a flow of how the screens will progress for different features. And this can be used to talk to the client and see if both the client and the developers are on the same page. And third, these elements can be changed immediately on the fly. If the client wants some features, or some buttons or some navigation to be changed, these elements can be changed immediately based on the given feedback. So, that was about paper prototypes.

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Types of Prototypes



Taken from Prof. Philip Guo's Intro to HCI course -
<https://ixd.ucsd.edu/home/f16/lectures/IntroHCI-f16-Week2.pdf>

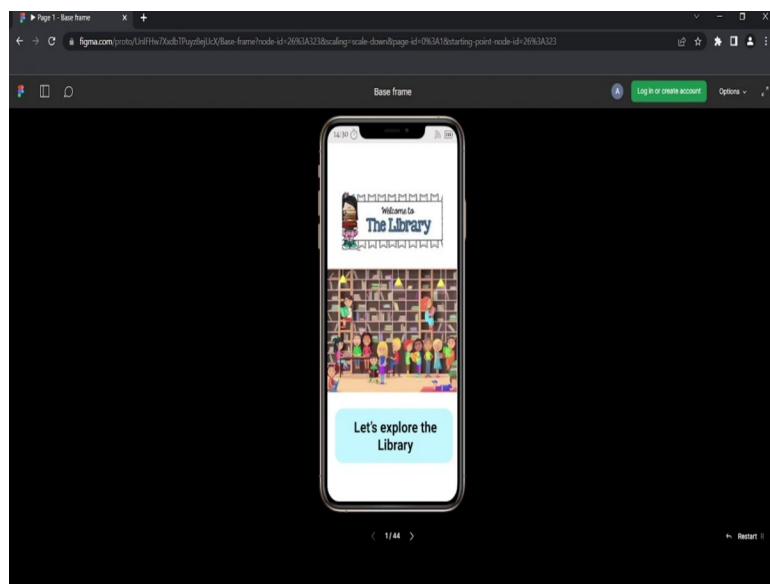


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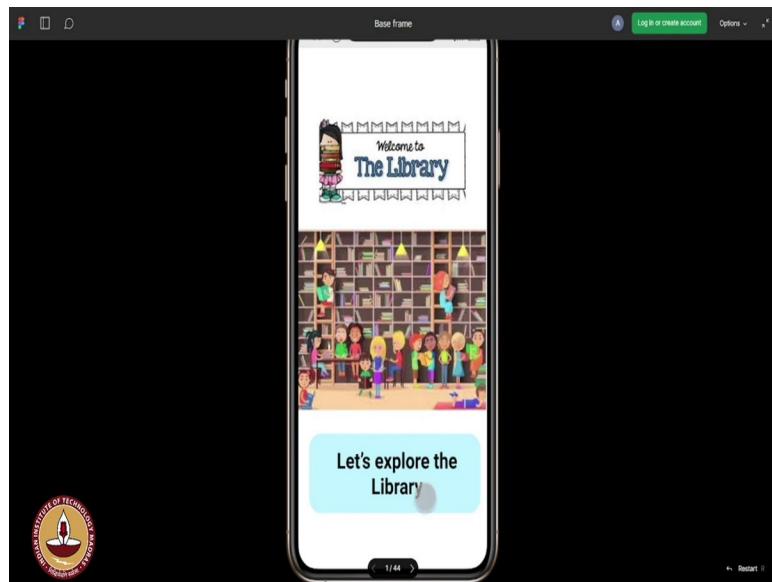
Another type of prototype is to use digital mock-ups, using tools such as Photoshop, PowerPoint, etc. and these are more-closer to the final product. So, let us look at the same example of what we saw in the paper prototypes. And let us see how we can transform or translate this paper prototype into a digital mock-up.

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So, we saw how we can develop paper prototypes. And now once we have these paper prototypes, it is not very difficult to translate them into digital mock-ups. So, you can use tools like PowerPoint, Photoshop, and another tool which can help you do this is known as figma. So, let us see how this the paper prototype has been translated into a digital mock-up.

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So, here, you can see that you can explore the library.

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So, there are buttons which are clickable.

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And I can click on any link.

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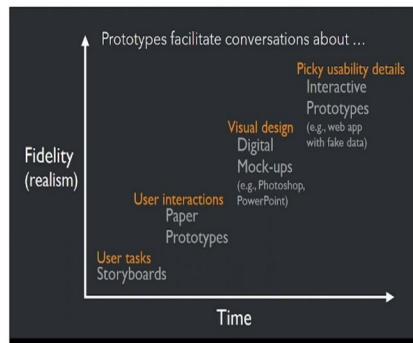




If I want to read some eBooks for a particular subject, and here, I can see that these are the options which are available, you need not enable all the options. So, in this way, a digital mock-up can create or help you develop interactions for different screens in your application, and it moves you closer to the final product. And once you have this digital mock-up ready, you can show it to clients get feedback from them. And this will help you transition or move towards the final software product.

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Summary



Taken from Prof. Philip Guo's Intro to HCI course -
<https://ixd.ucsd.edu/home/f16/lectures/IntroHCI-f16-Week2.pdf>

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So, in this video, we looked at several prototyping techniques. And we saw that these prototyping techniques they differ based on when it is used in the development process. And its fidelity compared to the final product, or how real the product is compared to the final product. And we looked at several techniques.

And the important thing to note is that these prototypes they facilitate conversations about different things with their clients, among developers, designers etc. So, for example, the storyboard it facilitates conversations about the user tasks or the goals of the software system which we want to build. Paper prototypes goes one step further, where we design the screens, the UI elements on paper. And this helps us facilitate conversations about the actual interactions in the system whereas, in digital mock-ups and in interactive prototypes you talk about the visual design, or you talk about the final details of the user interface. So, in this way, these different types of prototyping techniques can help us refine our user interface and develop effective and usable interfaces.