**Usability Engineering**
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**Module - 11**
**Lecture - 35**
**Usability Heuristics and Testing**

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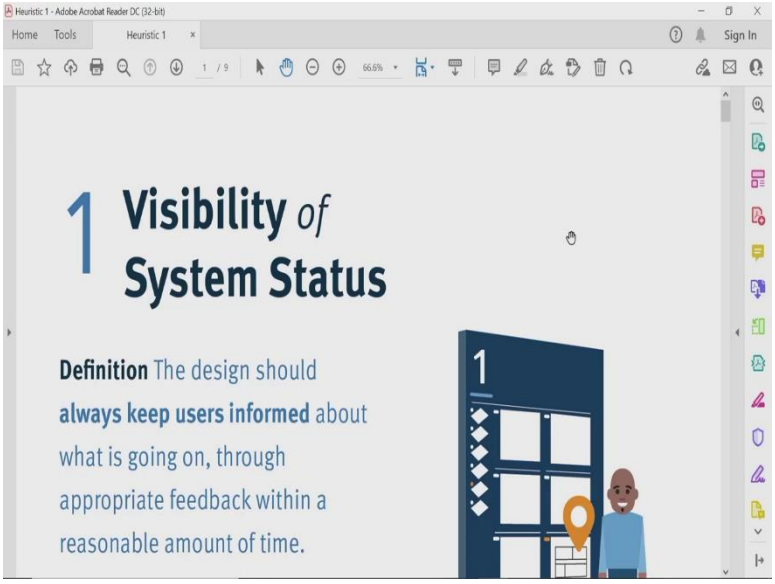


So, let us continue our discussion on the Heuristic Evaluation. Until now we have discussed about the first four heuristics which are visibility of system status.

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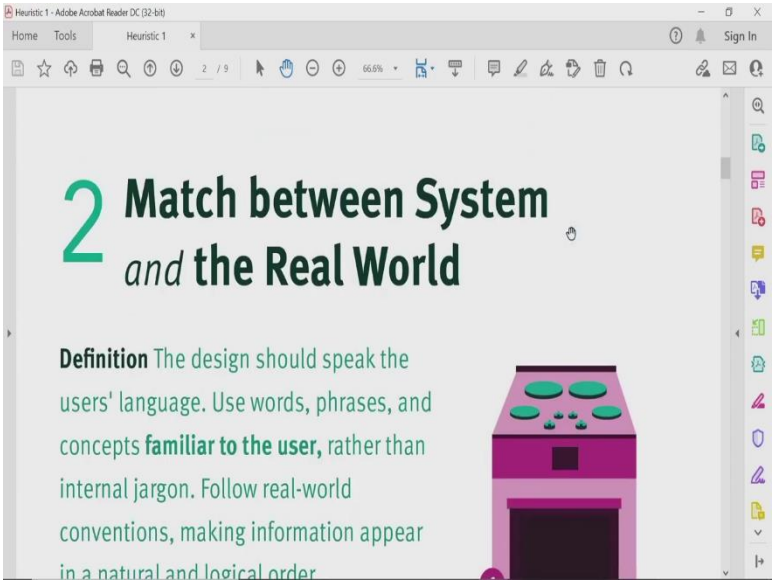


And then we talked about match between system and the real world the second heuristics.

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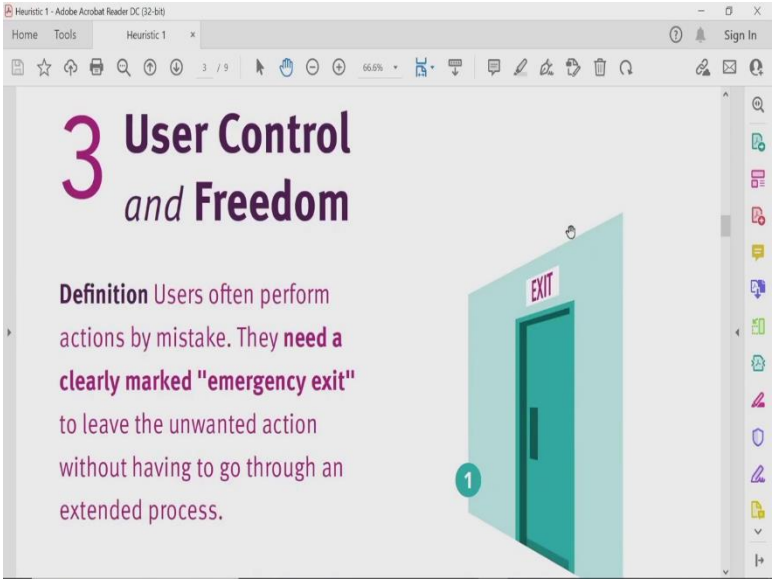


The third one we talked about user control and freedom.

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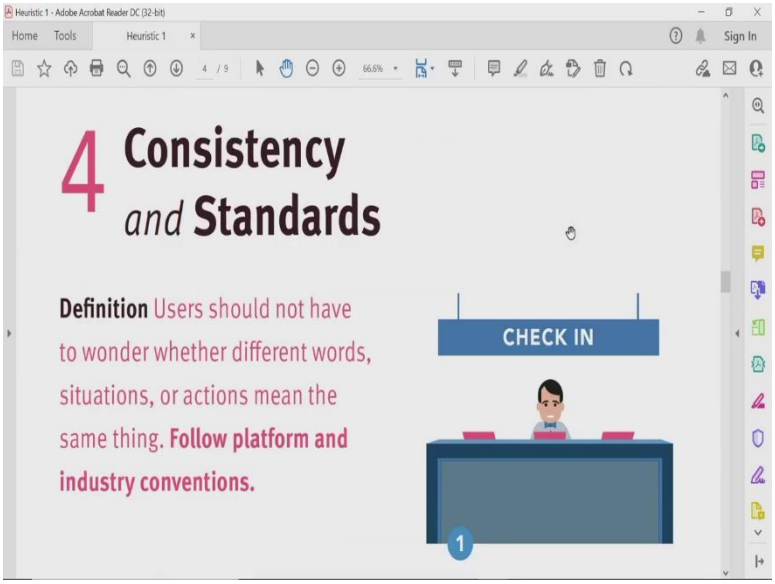


And the fourth one we talked about was consistency and standards.

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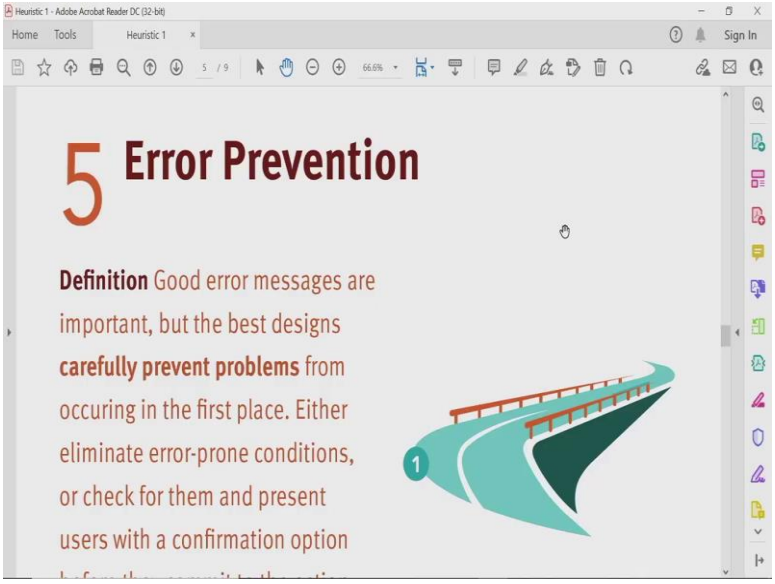


Now, continuing this session we will now discuss about error prevention. See error prevention is one of the most important aspect of heuristics. Because errors create a situation that leads to frustration among your users while they are using your product and if this situation is not addressed in a very very systematic and empathic way, then it may lead to rejection of your product by your customers.

So, by error prevention we mean what? We mean design of good error messages which plays an important role and that carefully prevents problems from occurring in the first place. See all of us know that it is almost impossible to design a system that is completely error free that is a ideal scenario which has designers we would like to have. But then it is almost impossible next to impossible to design a system that does not have any errors.

Now, having said that what is the way out from it and the way out is that you design a system or you design messages in such a way that, if somebody if your user is encountering a an error he can recover from the situation as smoothly and efficiently as possible. So, therefore, we must use our talent, our creativity in designing these messages carefully, so that these problems can be prevented occurring in the first place or the first interaction situation.

Now see in order to eliminate these situations you have two things that you can do as a designer, either you eliminate error prone conditions which is very very difficult. But which should be tried out you have quality assurance team; you have a lot of design audit teams that ensure that this kind of error prone conditions are eliminated.

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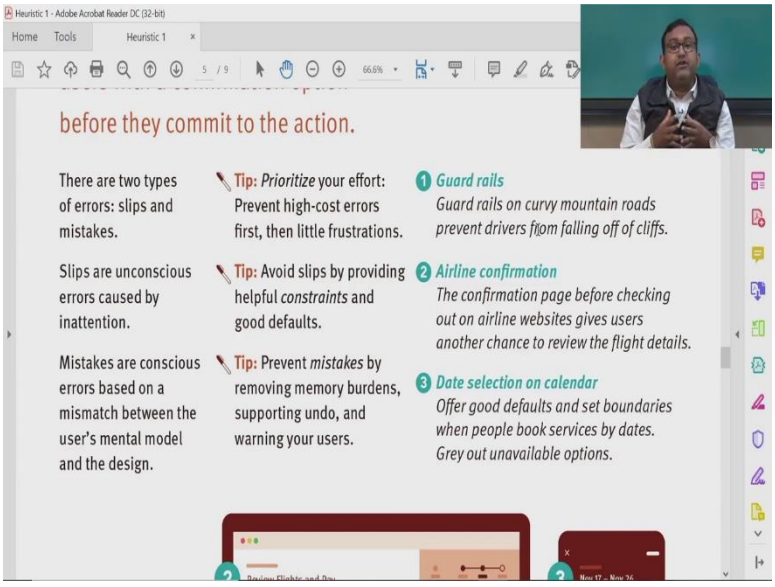


Or, what you do is that you check for them and present users with a confirmation option before they commit to the action. So, you essentially what you do is that you provide them with messages to make them aware of certain kind of activities which they have done

unknowingly, or to make them be alert that this kind of activity may lead to certain situations which might be uneventful for the scenario context they are working on.

So, therefore, you ensure that you check for them and present your users with the confirmation option before they come into the action. So, you want to make them aware whether they are confirming to the activity they would like to proceed. So, you can see lot of confirmation-based messages being delivered nowadays when you accidentally press something, or you want to commit take press a call to action feature and proceed for an activity.

Now, when we talk about errors we must understand and this is very crucial for the designers to understand is that there are two types of errors and these are slips and mistakes. Now slips are unconscious errors which are caused by in attention suddenly you know you press something or click something and because of that a certain kind of situation arises which can be called as an error.

Mistakes are conscious errors, now this one the other one the mistakes they are conscious errors and these are based on mismatch between the users mental model and the design. So, remember the discussion we had on gulf of execution, see the products conceptual model and the users mental model has to match for sure in order to ensure that a smooth interaction takes place.

Whenever there is a gap between this or there is a mismatch between the conceptual model of the product and the mental model of the user you can see a conscious mistakes happening you know and these are conscious activities. Now, what are the tip to help sort this issue? Prioritize your effort, so prevent high cost errors first then little frustrations. So, you must identify errors that are high cost incentive; that means, which may lead to major issues in terms of engagement of the users with the product.

Second avoid slips by providing helpful constraints and good defaults. Third prevent mistakes by removing memory burdens supporting undo and warning your users. Now this section that we are discussing you can relate this section with the structure of micro interaction that we have discussed earlier. If you consider the focus on the loop right, you would realize how loops are designed, how loops can be used. Because loops are not something which are a very regular activity

So, how do you design for them? What kind of trigger has to be there? Also you can relate this to the concept of fits where the concept of in index of difficulty is there. The more difficult a certain activity is to perform this can be related to the kind of slips or mistakes that can happen. So, if you design your call to action feature or a feature in such a way that it requires some amount of effort for the user to complete the task.

In those situations there is less chance by the user to commit errors. Now see guard rails on curvy mountain roads these are examples of how to prevent errors and real life prevent drivers from falling off the cliffs.

So, these are the examples of guard rails. Airline confirmation for example, the confirmation page before checking out on airline websites gives users another chance to review the flight details. There something that you ensure that things are in correct order, details have been fit accurately and no errors happen post the payment is carried out.

Date selection on calendar, so offer good defaults and set boundaries when people book services by dates grey out unavailable options. These are some visual feedback ways through which you ensure that the focus is maintained at the particular situation or the particular part of the interface where the focus needs to be there, so that errors can be prevented. So this was about error prevention.

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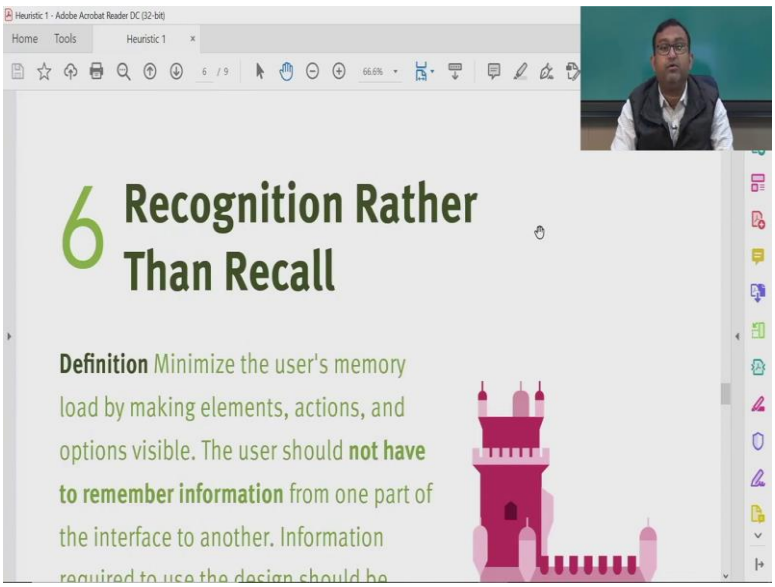

We would now move down to one of the other major important heuristic which is recognition rather than recall.

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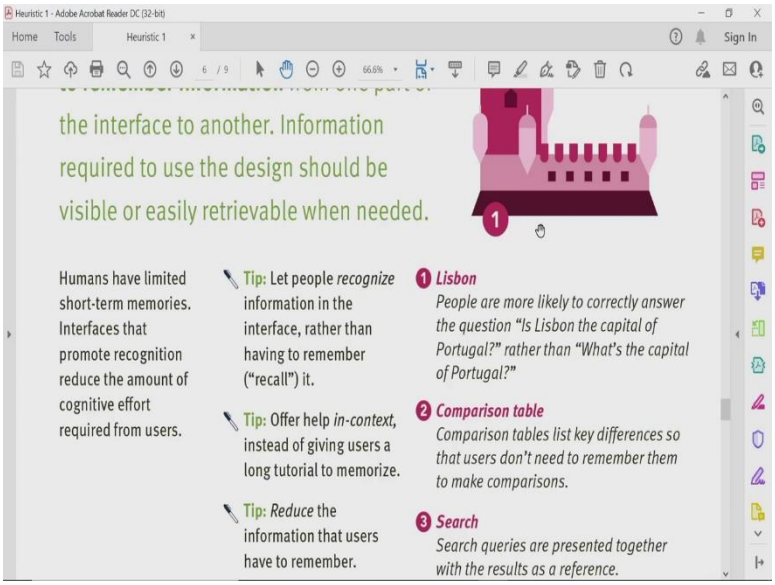


This means that minimize the users memory load by making elements actions and options visible. So, the user should not have to remember information from one part of the interface to another. Information required to use the design should be visible or easily retrievable when needed.

Now, this means what? See recall is a costly affair. Why it is a costly affair? Because it requires effort, it requires time and it requires a lot of digging from your memory in order to identify the cue through which you can comprehend or you can relate with something. So, therefore, recall is always costly affair instead of recall what we intend to focus on is recognition. So, humans have see you need to understand when we discussed about the cognitive aspects of information design.

If you can relate you would remember that humans have limited short term memories and interfaces that promote recognition, reduce the amount of cognitive effort required from users. So, something you directly see you recognize that is one effect. But in order to complete one activity you need to recall something from the past that is a costly affair. So, it is between what you recognize by observing at the visual cue versus what you recall from the past. So, recognition is always a better option to go with rather than recall.

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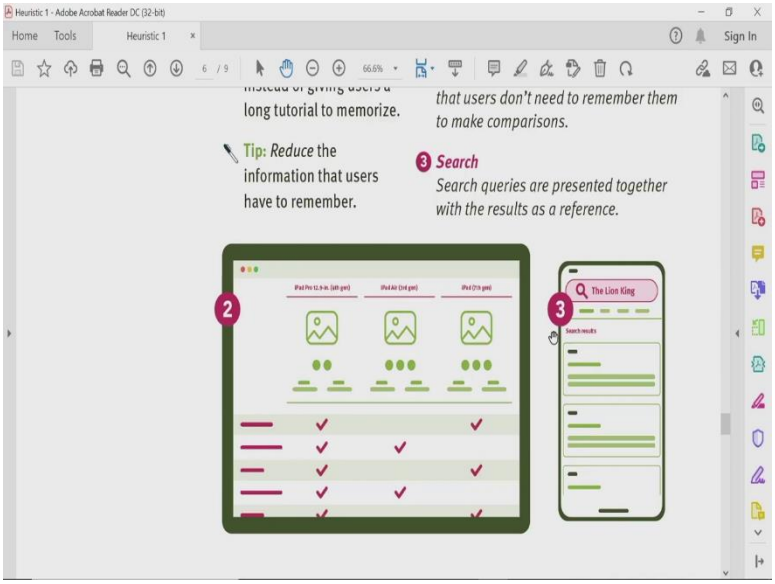


Now some of the tips are you know let people recognize information in the interface rather than having them to remember. For example every time you have to remember some pieces of information to complete your activity, it can be your address, it can be your card number, it can be so on and so forth some information. Now recognize would be rather an important aspect. Because you do not need to remember in those situations you just need to recognize and complete your activity.

Offer help in context instead of giving users a long tutorial to memorize that is a very interesting aspect you might have seen that during on boarding of applications. Nowadays applications take you through a journey of making you aware with the functions and with the toolbars where it is placed. It just direct out those spaces make the entire screen grey and make you to focus on those specific areas.

So, that the primary features the primary call to action functions can be accessed assessed by you, by your user more efficiently. Reduce the information that users have to remember that is of your primary concern. So, do not allow your user to remember something and then he or she has to come to your interface and then apply those information's and complete the task that is not an ideal scenario.

And why it is not ideal scenario? Because if he forgets he will not be able to complete the task it is as simple as that. So, therefore, we need to ensure that he or she recognizes from the visual cues that are present in your interface so as to complete his activity or task. Now

consider the situation that people are more likely to correctly answer the question and if the question is Lisbon the capital of Portugal?

Now, rather than if you put the question like this what is the capital of Portugal. They will not be able to recollect the name, but if you just ask this question in this way is Lisbon the capital of Portugal. There is more likelihood that he would be able to recognize the terminology the answer in the question itself and would be able to answer the question.

The second one is comparison table you know comparison tables list key differences. So, that users do not need to remember them to make comparisons. In majority of the B 2 C sites you would see this kind of you know comparison tables that allows you to compare products, allows you to compare features. In that way what happens is that while taking a decision you do not have to remember about other products and do an internal calibration in order to compare them.

You have out rightly there all the information is presented you can look at them and take an informed decision or a call whether you would like to buy, whether you would like to go forward with the subscription of the product. Then the third one is search, so search queries are presented together with the results as a reference.

So, whatever such query you have done or you have used to look at the search results those queries are presented. So, that you know with these keywords with these search query I have got these results. These are some of the examples of the heuristics which is focuses on recognition rather than recall.

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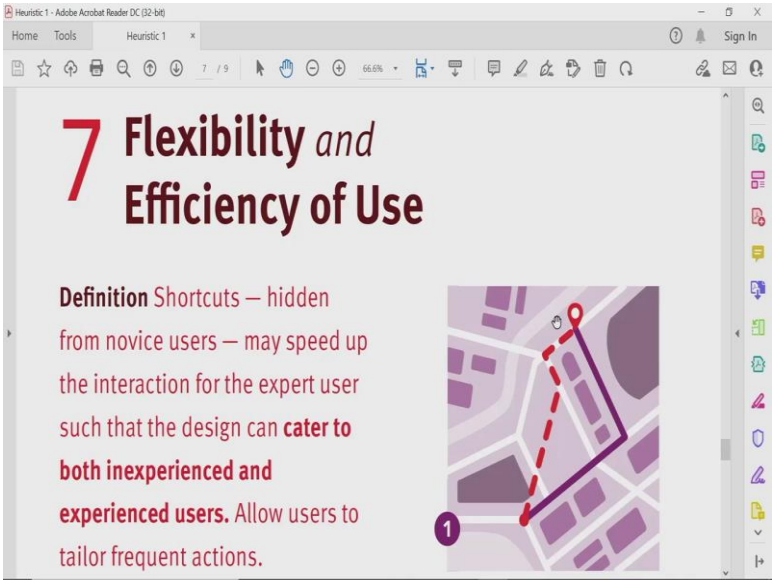


Moving on to the 7th heuristic; the 7th one is on flexibility and efficiency of use.

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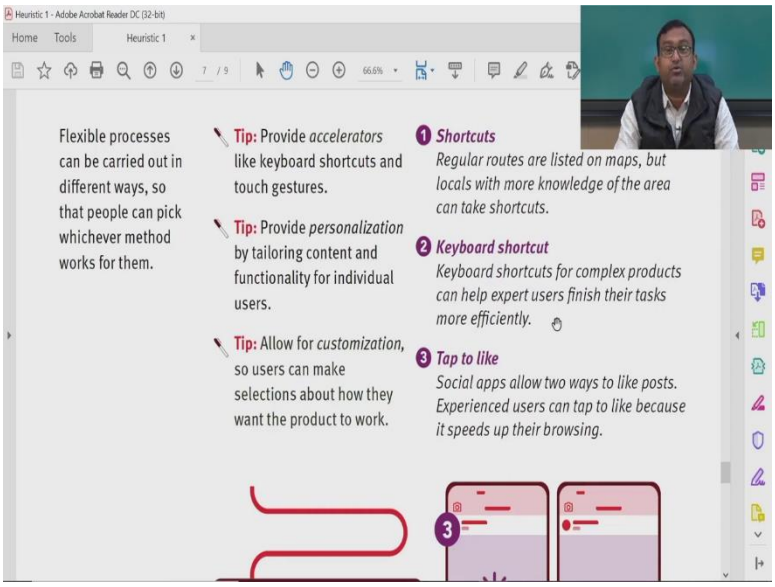


Now what does it mean? It means shortcuts hidden from novice users may speed up the interaction for the expert user. Such that the design can cater to both inexperienced and experienced users, allow users to tailor frequent actions. If you remember the discussion we had during fits, during KLM you would realize that we did have a discussion on the memory operators do you remember.

We talked about memory operators and what did we discuss? We discuss that when it comes to for a novice to complete a task he uses a lot of memory operators. Because he is first time he is using the system and therefore, he is not aware of multiple features, multiple interfaces and therefore, he takes time to recollect things from his memory to relate to his past experience and then complete his task.

Now, this is completely different when you compare this with the experts; experts do not use the memory operators. They do not go back to their memories often in order to interpret the interface features. Why? Because they have been using the interface features for long and therefore, they are completely aware of which features which product which features are presented where.

So, in short what we can say that they are very very confident and clear about the information architecture of your product and therefore, it has become a routine activity for the experts to complete the task. Now if your software does not cater to these two groups of people then what would happen? For if the focus is more on novice if you know he has to complete task in a traditional way, he has to quick, he has to click things in detail formats, number of clicks are more he has to complete the task

Then once he becomes expert he would leave your system. Because once a person becomes expert, once your user becomes expert he or she always looks for improving the efficiency of task completion. So, he would look for shortcuts, he would look for ways to minimize the number of clicks and reach to his goal early that is what we are focusing on flexibility and efficiency of use.

Now, for a software that you have designed it must cater to both these categories. Now not only that you also have the intermediate user, user who is migrating from being novice to an expert that group is also there. So, you must also entertain to that group. So, the software should be designed in such a way that it should not only allow the novice to learn the software and migrate from being novice to expert.

But it should also allow experts to use shortcuts and complete his activities not in the novice path, not in the way the novice completes, but in the quickest possible time, that is what we understand by flexibility and efficiency of use. So, flexible processes can be carried out in different ways. So, that people can pick whichever method works for them. So, provide some of the tips are that provide accelerators like keyboard shortcuts and

touch, gestures, provide personalization by tailoring content and functionality for individual users.

Allow for customization so that users can make selections about how they want the product to work. Shortcuts regular are very important in crucial aspects of an addressing these issues like you know regular routes are listed on maps. But locals with more knowledge of the area can take shortcuts that is what we mean by shortcuts. Keyboard shortcuts many of you must have used keyboard shortcuts while you are using illustrator or photoshop or team weaver or any other processing software's right

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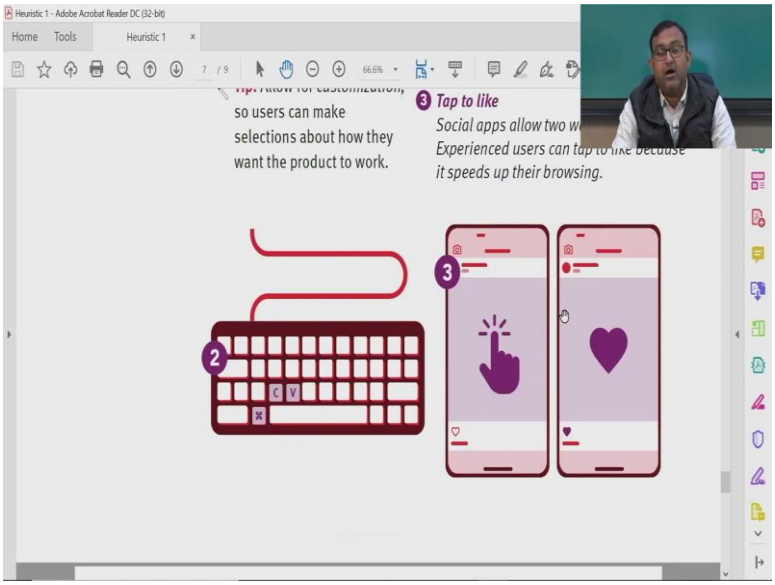


Tap to like social apps allow two ways to like post, experienced users can tap to like because it speeds up their browsing right.

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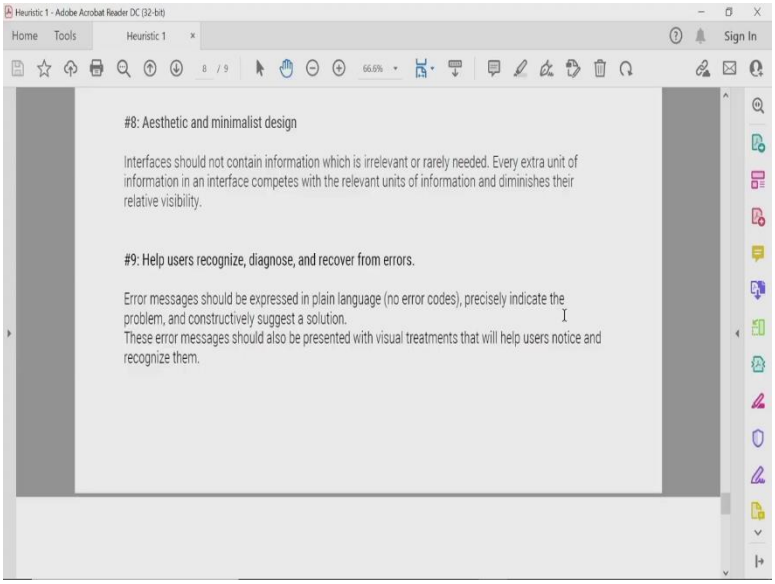


So, these are some of the examples of flexibility for use. The 8th one is aesthetic and minimalistic design. Now see interfaces should not contain information which is irrelevant or rarely needed. Every extra unit of information in an interface competes with the relevant units of information and diminishes their relative study. See when we talk about aesthetic interfaces we must understand the first level of engagement between the users and your product happens at the visual realm.

So, the visual domain the first moment he looks at your interface he looks at the branding, he looks at the way your interface has been designed, color palettes has been chosen, the greed's have been chosen.

Your close proximity of your UI towards the material design guidelines those things plays a major role in ensuring that the user feels confident about the interface because it provides them with an idea that the interface is nicely designed. It is highly aesthetic in nature and therefore, it provides a experiential a positive experiential state to the user.

And when we talk about minimalistic design we must ensure the things which are redundant for a person at a particular page must be addressed. Because remember Hooke's law more information that you provide it leads to more amount of time for the user to process that information and take a decision. So, whatever is required provide that do not go on adding more and more information because that would lead to cluttering of the interface.

Also I would like you to understand that there is a concept of breathing space your eye gets tired if it moves around too many information. Therefore, in good design interfaces you would see that white spaces are being engineered across the interface. So, that your eye gets a breathing space a space to relax and then again start the scanning behavior. These are crucial aspects for designing an interface that is more aesthetic in nature.

Though it is beyond the scope of this course, but I would like you guys if you want to read more on aesthetic design you can follow just all principles go and see across many blog posts, many online resources that are available that would allow you to see how the gestalt principles can be used to design meaningful web interfaces that are aesthetic in nature.

Also look at other principles of color, color theory, color palettes color wheel. So, that you understand how colors play an important role, how the science behind visual realm actually plays a major role in persuading your users to accept your product. So, that was the 8th heuristic which was about aesthetic and minimalistic design. Now, coming down to the 9th one is help users, recognize, diagnose and recover from errors this is almost very similar to what we have discussed in the 5th one that is error prevention.

Now here the focus is that error messages should be expressed in plain language if you remember in earlier windows platforms we used to get error messages like 402 error this error that with some codes. Now, those error messages do not help us to understand the state and also does not allow us to comprehend the state as well as inform us kind of activity that needs to be taken. So, therefore, those error messages are redundant for us. So, precisely we must precisely indicate the problem.

As much as possible we must design these error messages in a way that it should indicate the problem and constructively suggest a solution to our user. These error messages should also be presented with visual treatments I mean you can use icons, you can use illustrations to come communicate this message. And these will ensure that it will help users notice and recognize them and would also let them understand what needs to be done so that was about the ninth heuristic.

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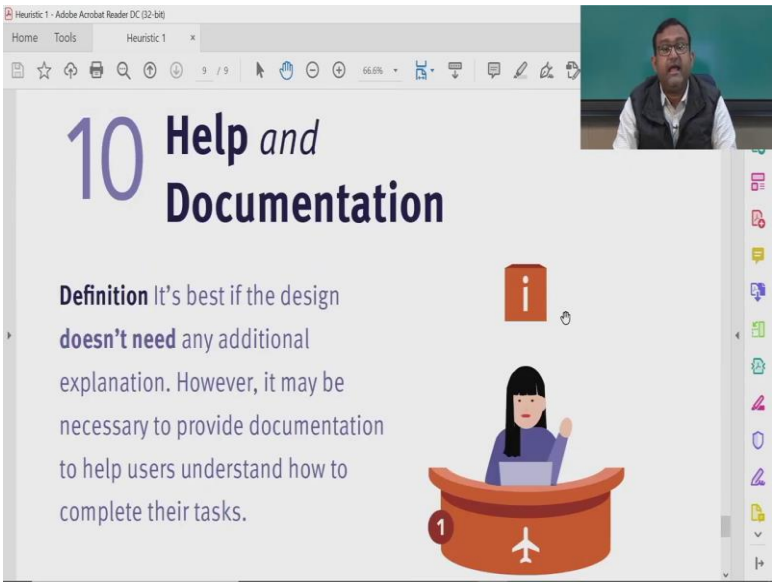


And the final one the 10th one is help and documentation. I mean this is the most common heuristic that people follow, your users will do. See if nothing works if error messages are not working, if the users are encountering a lot of errors what is important that they would fall back to the help and documentation page to address or to ensure that they recover from these errors.

And therefore, help and documentation is so important. So, it is best if the design does not need any additional explanation. However, it may be necessary to provide documentation to help users understand how to complete their tasks. Now many a time you know you never can estimate the kind of situation, the kind of context, the kind of individual personality type that your user has and is currently undergoing while working in that conditions with the product.

So, it may be ideal for you if you want to really help them out that if they are unable to you know comprehend the error messages. If they are unable to use the supporting designs that you have made out to help them recover of the error, you then design or put the help and documentation information in such a way that they can fall back to this place and can come up or recover from the state they are currently facing.

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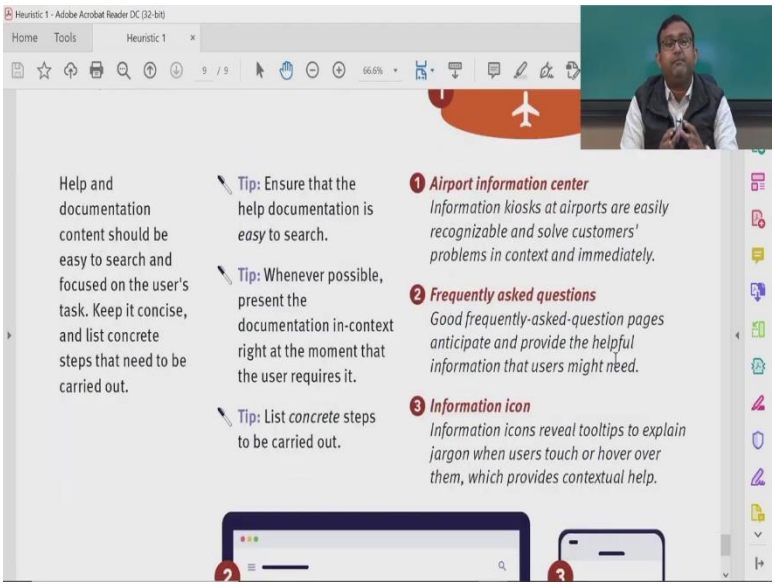


So, help and documentation content should be easy to search and focused on the users task. So, it is contextual in nature keep it concise and list concrete steps that need to be carried out. Some of the tips are you can ensure that the help documentation is easy to search wherever possible present the documentation in context right at the moment that the user requires it. Then list concrete steps to be carried out in case of specific situations, states or error messages or while facing some difficulties with the activities or tasks.

Now, some examples that we are going to talk about is the airport information center. Now information kiosks at airports are easily recognizable and solve customer's problems in context immediately, frequently asked questions very very nice and effective way of addressing concerns that your user is facing. So, good frequently asked questions pages anticipate and provide the helpful information that users might need these are eventually this let us a good design of this frequently FAQ's would ensure trust and build on the brand reputation of your product.

Information icon you know information icons reveal tool tips to explain jargon when users touch or hover them which provides contextual help. These are the important heuristics that have been defined by Nielsen and Molich that are being used by the name heuristic evaluation in the design industry right. So, whether you are doing a heuristic evaluation on your own on the products or you are using experts to conduct a heuristic evaluation.

Ensure that these stand heuristics are always being referred in order to audit or analyze your product.

I would also go one step forward and invite you to look for more niche heuristics that have been developed for specific context like FINTECH, B2C education. And those heuristics can add an extra layer to the already generic heuristics by Nielsen and Molich and can lead you to design an interface a software that is much more usable by your users. So, we come to the end of heuristic evaluation we will now discuss about usability tests.

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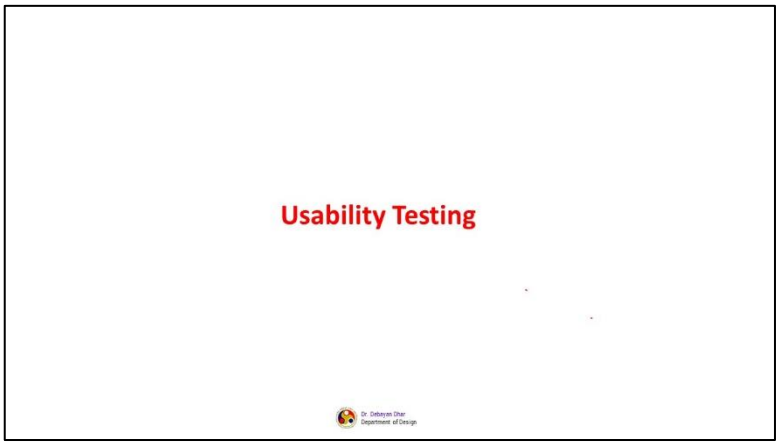


We will now discuss about usability testing. See we have come down to the fag end of this course and in this module 11 we would introduce usability testing followed by detailed discussion about a user testing or usability testing as many people say in module number 12.

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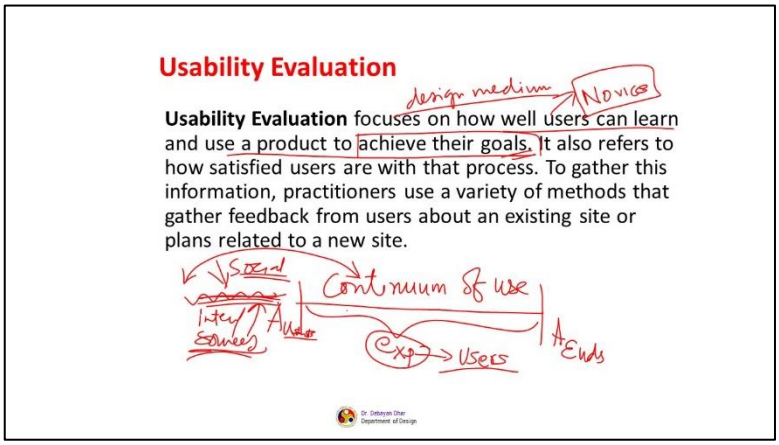

So, before we talk about usability testing let us understand or recap some of the things that we have already discussed about usability evaluation. See usability evaluation focuses on how well your users can learn and use a product to achieve their goals. Now it also refers to how satisfied your users are with that process. Now to gather this information practitioners use a variety of methods that gather feedback from users about an existing site or plans related to a new site.

If you remember to the discussion that we had earlier you would notice that we discussed about the continuum of use right. We call this as continuum of use, when the actual use starts and the actual use ends right this is starts and this end. This entire continuum is based on the experience that your user gathers. And this experience is what? This experience is based on the gulf of execution. The more the gulf of execution is the probability that the experience will go to the negative state is higher.

Lesser and the gulf of execution is probability that the experiential state would go in the positive side will be higher that is the idea that you must remember while we talk about usability evaluation. Because if you see here that the focus of usability evaluation is on how well your users can learn. Here the focus is on novice users, but remember every time we are not designing for novice users. We might be redesigning a product that is already being used by a particular group of people.

In those situations, our focus should be the kind of experience they had with the existing product did we ensure that that level is increased, their efficiency is increased right. So, at that time we would be catering to the experts. Now the focus is on novice users and how they can learn and use a product to achieve their goals. See the moment a new product is presented a new product is being presented in front of your customers. There is some amount of time that the user invests in learning the medium.

When I say learning the medium I mean learning the interfaces, learning the features of the interfaces, understanding the information architecture, understanding the task flow. For this he needs to spend some time interacting with the interface and ensure that ok this is how the interface is going to work, this is where the information is provided. If I want to use this function or if I want to complete this activity I need to go there, I need to click here, that is what we call as the mental representation

Now, remember before the actual use at this state he already has a mental model how the product is going to be and that is influenced from his social circle. Social or whatever he has read from the internet or from the sources whatever it can be many other sources. Everything has influenced his mental model or he might have used somewhere else also.

And he is coming down to that actual use situation with an influenced mind, with the mind that has already the structure built in it. Now it is this so as a designer our role is very complex without design we intend to satisfy his demand. Satisfy what he or she wants to get or the kind of structure he already has, whether our conceptual model of the product meets his expectations or not.

So, we are designing the medium and the user needs to learn it right and complete use the medium to achieve the goal. We are now understanding a fact that, it is this ability of the person to evaluate whether the medium is the same one that he has in his mental model and whether he has been given the similar medium that represents his mental model or not that is what we are talking about the concept of usability

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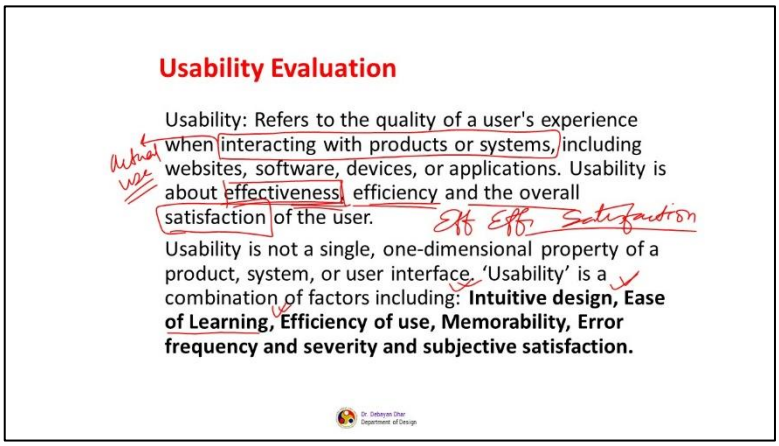


Now, usability refers to the quality of a users experience when interacting with the products on the systems. See here this is pretty clear that the focus is on the actual use is not it and the products includes websites, software's, devices and applications. So, usability is about effectiveness see these are your parameters that will define the usability of a system, effectiveness, efficiency and the overall satisfaction.

So, what we have effectiveness, efficiency and the overall satisfaction these are your parameters some of the parameters you can go in detail constructs also. Now it is important

here to understand and realize that it is not a single- or one-dimensional property. The moment we say usability it is not only one-dimensional property of a product system or any user interface. No, it is not.

Usability is a combination of factors and what are these factors? These factors are we can say intuitive design; that means, what is here matches in real world. Ease of learning see ease of learning efficiency of use memorability error frequency and severity and subjective satisfaction these are some of the parameters right.

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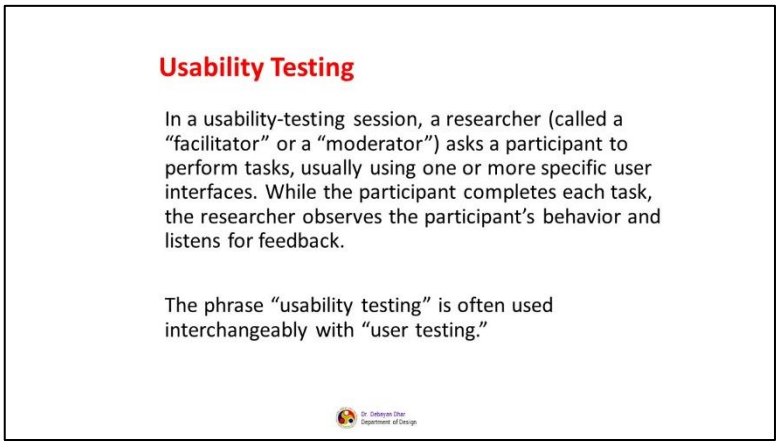


So, in a usability testing session a researcher a usability researcher or a design researcher who is often called as a facilitator or a moderator also asks a participant to perform tasks usually on one or more specific user interfaces. So, only participant completes each task the researcher observes the participant behavior and listens for the feedback. So, the session is like this while he is completing the task his whatever verbalizations are being made, whatever gestures are being made his on-screen behavior are recorded.

And we also take pre-whatever before the task is completing, whatever before he is being given the task his notions his other his idea about the product we can collect that in pre-usability test data. And post also after he completes the task we can also collect data. So, the phrase usability testing is often used interchangeably with the term user testing.

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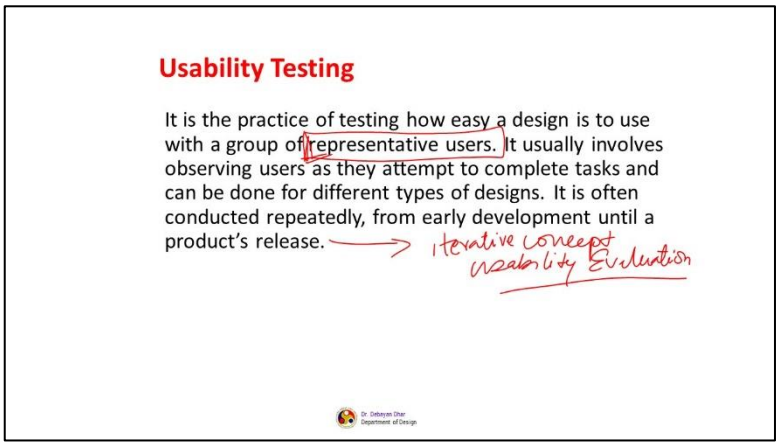


Now, it is the practice of testing how easy a design is to use with a group of representative users. Remember this word you are going to go do a usability testing or user testing with representative users, users who are actual users, who resemble the actual users of your product. So, it usually involves observing users as they attempt to complete tasks and can be done for different types of designs.

It is often conducted repeatedly, frequently from early development until a products phase and that is why we call as that the iterative concept of usability evaluation. We have heard about cognitive work through, there are many formats many techniques through which we do this iterative usability evaluation of our concepts and the systems that we are designing.

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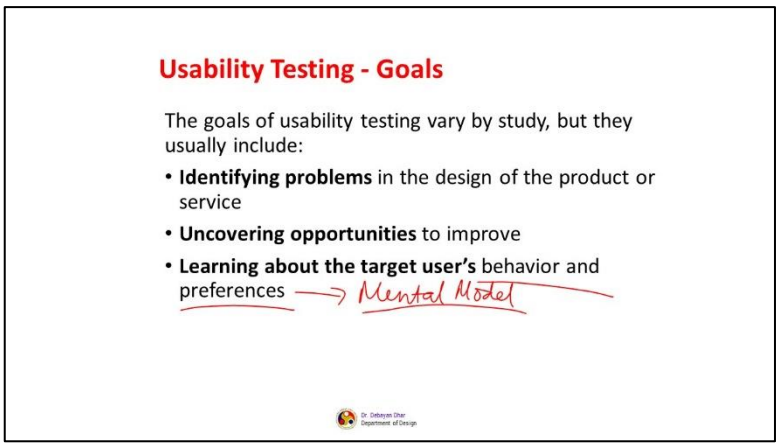


So, the goals of usability testing they vary from study to study based on the study that you are doing. It can be whether you want to see your designs whatever concepts ideas that

you have generated. They match the mental model of the user or not the objective can also be whether if you are going for a redesigning of a product. Whether the old design is effective more than the new one or the new one is more effective than the old one.

So, it can vary from study to study and the goals of your study right. So, ideally it should be what identifying problems in the design of the product or the service, uncovering opportunity areas that is what we have discussed earlier that leads to further improvement of the product or going for design intervention. And learning about the target users behaviors and preferences, because this is what will actually let us know about their mental model.

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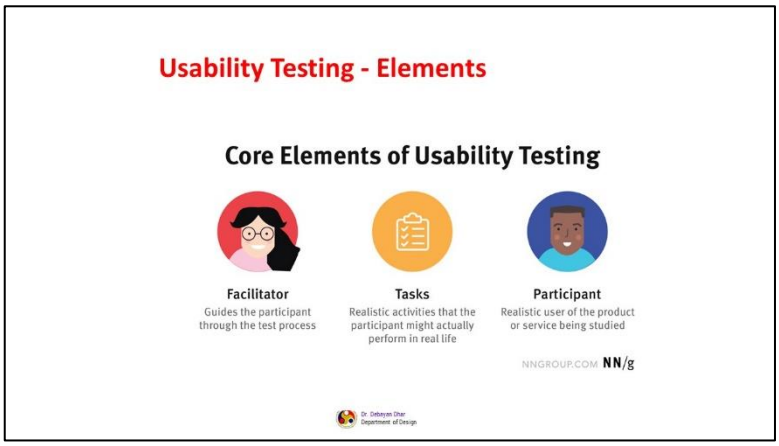


So, at the core of usability testing the core elements are what? This is a very nice representation that the normal Nielsen group provides us with. There is a facilitator, there is a task and there is a participant. So, you have the concept of your product the software that you have conceptualized, you have created a prototype of it.

There is a particular task that you want the participant to complete. So, therefore, there is a task and there is a participant who completes the task and there is a facilitator who guides the participant through the entire usability testing process.

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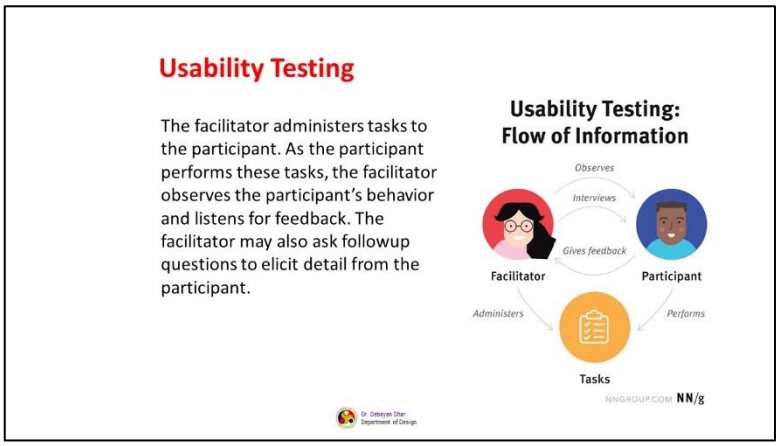


Now the facilitator administers tasks to the participant as the participant performs this task. The facilitator observes the participants behavior and listens for feedback, recording can also be done. If you take permission from the participants and the facilitator may also ask follow up question to elicit detail from the participant that is the structure of flow of information of usability testing.

Given this structure now the question is what kind of data is gathered? How those data can be analyzed? What are the standard questionnaires? What are the standard instruments that are used for collecting data post this task. We are going to discuss them in module 12 in detail.

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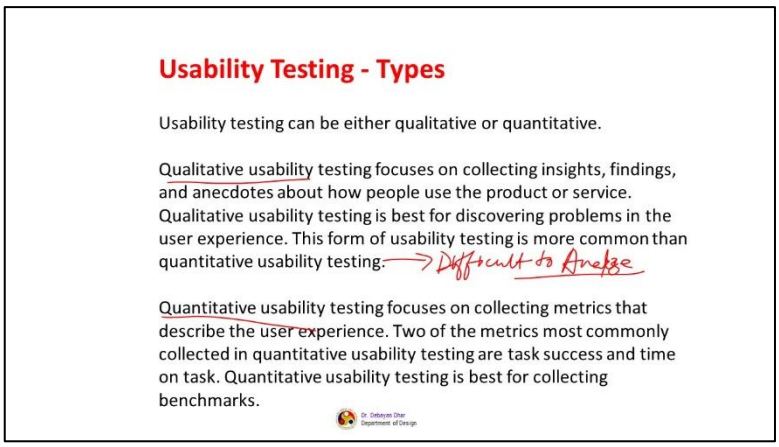


So, before we enter into the details of type of data we must understand that when we go for this kind of usability testing where we have a facilitator, we have a task, we have a

participant. The study can be of two major types and these are the qualitative usability testing and the quantitative usability testing. [FL], we have already discussed in short in earlier modules. Now qualitative usability testing focuses on collecting insights, findings and anecdotes about how people use the product or service.

Qualitative usability testing is best for discovering problems in the user experience. And this form of usability testing is more common that quantitative usability testing. But remember these are very very difficult to analyze, these types of data are very difficult to analyze. In comparison to that quantitative usability testing focuses on collecting metrics that describe the user experience like efficiency of use, number of errors they have completed, satisfaction. Two of the metrics most commonly collected in quantitative usability testing are task success.

So, amount of time they could complete the task the participants and time on task. That means, we are trying to understand the efficiency of task completion or efficiency of use. Quantitative usability testing is best for collecting benchmarks. If you remember our discussion in order that we need to create a benchmark we can go for a quantitative usability testing and define the benchmarks of our system.

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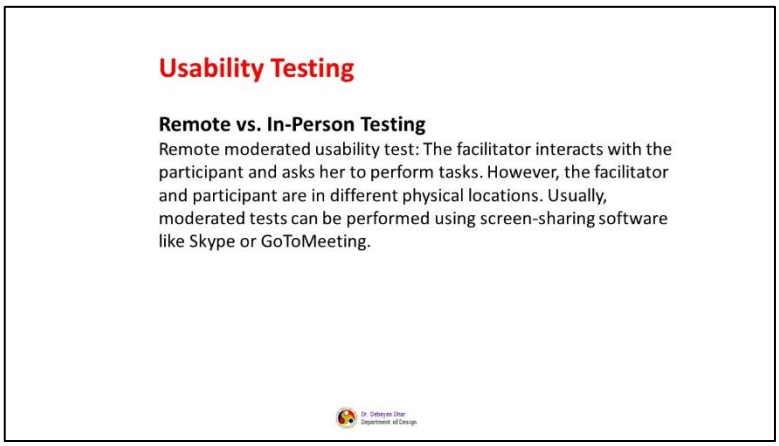


Now, many a time you may not be able to collect usability or you may not be able to conduct user tests on your own I mean you will not have users at your place. In those situations, there is the concept of remote usability testing, what are these? So, there is a two way of conducting usability testing which is known as the remote one and is the in

person one. Now the remote moderated usability tests the facilitator interacts with the participant and asks her to perform tasks.

However, the facilitator and participant are in different physical locations they are not at the same location and they are mediated through software's or online systems like you can use a Skype, you can use some screen recording software's right. Usually moderated tests can be performed using some screen sharing software like Skype or go to meeting so on and so forth.

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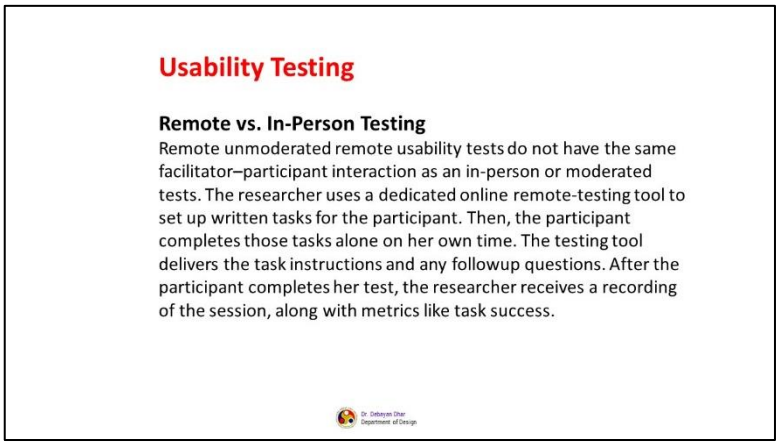


And in remote unmoderated usability test do not have the same facilitator participant interaction as an in person or moderated tests. The researcher uses a dedicated online remote testing tool to set up written tests for the participant. So, it is an online medium you have an online questionnaire online task being set up and the user complete the task and fills up the questionnaire.

So, that you can understand about the experience during the task, the participant then completes those tasks alone on her own time that is one of the constraints. Because you never know see ideally once a task is completed immediately after if the recording is done about the data, about the experiential data you will get rich data. Otherwise there is some kind of errors in that data.

Now the testing tool delivers the task interactions instructions and any follow up questions. After the participant completes her test the researcher receives a recording of the session along with matrices like task success. This is some of the examples of remote unmoderated usability test. Next what we will do? We will discuss about details about the usability

testing questionnaires about the type of data how they can be analyzed. In the subsequent module, module 12 we will focus on all those issues.