

User Interface Design
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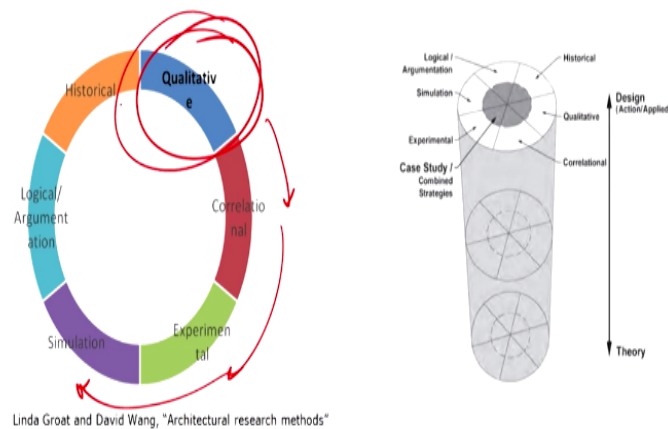
Lecture - 06
User Research - I

Hello students. Welcome to the online NPTEL course, User Interface Design. In the previous class we started this, we discussed about the generic design methodology of user centric approach of interface design. So today we will start with the detailed step-by-step process of the design. So first we, as we have already discussed, this is a bottom-up approach of design and waterfall model or the iterative approach of design.

And so we start with the user research and today we will discuss about the user research process and then we will continue towards the next stages of design.

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• Design and research Methods



So as we have discussed earlier, so here this process of design is a qualitative process. Mostly, they can be correlation, they can be experimental in few cases if we are correlating 3 different phenomena or ethnographic survey or similar user group then it can go into correlational research and then if you are doing some experiments in artificial setup then it can be experimental. And then simulation, if you are running some simulation.

For example eye trackers and other testing devices if you are applying then it can. But mostly the research process is qualitative research. That we have already discussed in generic design methodology.

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- Qualitative research

① Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter.

② This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them.

③ Qualitative research involves the studied use and collection of a variety of empirical materials.

Quantitative Methods	Qualitative Methods
Why are n 30 like the free ice cream? Interesting.	What did you feel when you saw the free ice cream?
	Freaked. A little scared.
	And why was that?

So let us talk about the qualitative research and what is the process. What are the tools and techniques and tactics of qualitative research and similarly if you want to correlate few similar phenomena to qualitative research and then correlation will be the process of correlation. And experimental and simulation we will be discussing how this research can be experimental in the later stage when we will discuss few different tools.

And techniques of eye tracking which can be one of the process of making an experimental research in user centric approach of interaction design. So in qualitative research, qualitative research is a multimode, it has multi-method and focus involving, the characteristics is interpretation in naturalistic approach of where the subject matters. So in the natural setup the subject matter will be explored.

And what they are doing what the subjects are doing in the natural setup that is the one of the characteristics of the qualitative research. Now next is this means the qualitative researchers study things in the natural settings attempting to make sense or interpret phenomena in terms of

the meanings people bring to them. So there are 2 process. One is the natural setup and the human behavior, human or the user behavior.

So this relation of natural setup, within the natural setup how people behave. So that is the main feature of the qualitative research. Within the natural setting if the subject has been given a task, how do they perform within a setup that is the approach of qualitative research. So in the qualitative research there is no, generally people are studied in the real environment. So there is no artificial environment created or artificial simulation is not being run.

So if you run a simulation on artificial environment, then it might go to the experimental research or simulation research. Now qualitative research involves the studied, use of collection of variety of empirical material and it can also be different, amalgamation of different methods. So different approach to study the same behavior in the natural setup can be compared and then the designers interpret the user experience designers interpret why this phenomena or this kind of behavior is happening.

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✓ Characteristics

✓ Emphasis on natural settings:
Researchers use research tactics that engage people within the context being studied, while the context itself is studied in its natural state.

✓ This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.

Now what are the characteristics of the qualitative research? Emphasis on natural setting, that I was telling in the previous slide. So researchers use research tactics that engage people within the context being studied. So this is the natural setup and this is the people or the user and this correlation will be studied, how they behave within the natural setup. While the context itself is

studied in the natural state and why the natural setup is so important because people's behavior is not an isolated thing.

So it is being guided by the natural setup and the context, in which context they are behaving this way, that is also very important. If the context or the natural setup changes, their behavior might change. You can give the same task to perform the users and in the natural setup 1, users might behave, the behavior might be different in natural setup 2 same user group same task can give you different behavior.

So that is why the relation between the natural setup and the user is very important and researchers or designers has to look at why this behavior is happening in correspondence with the particular given setup. This means the qualitative researchers study things in their natural settings attempting to make sense of or interpret phenomena in terms of the meaning of people bringing to them.

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• Characteristics

Emphasis on natural settings:

WAYFINDING AS A TOOL TO PROMOTE MEHRAULI ARCHAEOLOGICAL PARK DELHI

Research Methodology: This is an exploratory study. The research is conducted through a series of interviews with the site visitors, the site staff, and the site management. The research is conducted through a series of interviews with the site visitors, the site staff, and the site management. The research is conducted through a series of interviews with the site visitors, the site staff, and the site management.

1. How do you find the site? (Mehrauli Archaeological Park?)

2. How do you find the site? (Mehrauli Archaeological Park?)

3. How do you find the site? (Mehrauli Archaeological Park?)

4. How do you find the site? (Mehrauli Archaeological Park?)

5. How do you find the site? (Mehrauli Archaeological Park?)

6. How do you find the site? (Mehrauli Archaeological Park?)

7. How do you find the site? (Mehrauli Archaeological Park?)

8. How do you find the site? (Mehrauli Archaeological Park?)

9. How do you find the site? (Mehrauli Archaeological Park?)

10. How do you find the site? (Mehrauli Archaeological Park?)

Khan, I. H. (M.Arch. Dissertation Project, IIT Roorkee)

Now this is one of the example has been done by one of the student of M. Arch student of IIT Roorkee, Irfan Khan. So he have studied the web finding behavior of Mehrauli Archaeological Park which is a heritage precinct and within the precinct different monuments are there and scattered in a landscaped area and he have applied different techniques. So multiple strategy or multiple technique to interpret the human behavior is also very important.

First technique is the questionnaire. So he have prepared this questionnaire and people answered, users answered this questionnaire. So how do they feel and whether they can navigate within the landscaped precinct, heritage precinct and whether they are getting lost or whether it is well-designed or the signages are helping them or not.


Next after this task, he have conducted a second task which is he wanted to create, ask users to create the mind map or the what do they interpret about the, how the map of the surrounding is getting perceived by the user. So they have drawn, users have drawn these maps in different format. So these two are the mind maps and the next task was how, so he have asked them to perform a task from location A to location B how do they go.

So different users have given different directions. So based on these 3 task questionnaire drawing the mental map and drawing the route or the navigation sequence of the navigation he tried to interpret whether this area performs properly or not, whether there is any problem in the navigation or not.

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- Characteristics

Emphasis on natural settings:



So after that he came up with one web based application and another mobile application for giving the information about the heritage precinct and for better navigation of that. So through this ethnographic survey different tools and techniques of survey which he have conducted

within the natural setup he have come up with the design. So it starts with the user's behavior in the natural setup and then how whether they are finding problems and based on that design solution.

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- Characteristics

- ✓ Focus on Interpretation and Meaning:

Researchers should not only ground their work in the empirical realities of their observations and interviews, but should also make clear that they play an important role in interpreting and making sense of that data.

An in-depth engagement with participants fosters communication and understanding.



Now another characteristics of this ethnographics of this qualitative research is focus on interpretation and meaning. So why they are doing, so one is natural setup another is user group and then what is the salient meaning going behind. So that might not be uttered by the users. Users sometimes will not tell you why they are performing but that is the researchers and designers job to interpret what is the intangible meaning going behind.

The researcher should not only ground their work in the empirical realities of the observation and the interviews, but should also make clear that they play an important role in interpreting and making sense of what the data is. So what might not be the visible parameters of the, visible observation but what is the meaning going behind. Why people are performing that layer of interpretation should also be derived by the users or researchers.

An in-depth engagement with the participants fosters communication and understanding. So the task what the fact and researchers are doing. So what are the special and intangible meaning that should also should be interpreted by the researchers.

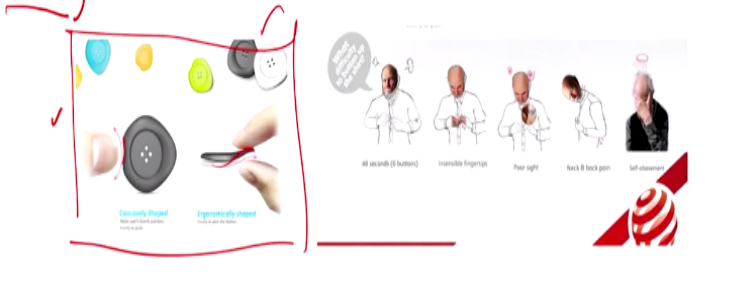
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- Characteristics

Focus on How the Respondents Make Sense of Their Own Circumstances:

An essential aspect is to explore each participant's interpretation of the workplace in his/her own terms.

Example: in-depth interviews and analysis from the contextual perspective provides insights of real problem.



Now another characteristics of the qualitative research is focus on how respondents make sense of their own circumstances. An essential aspect is to explore each participants interpretation of the workplace in his or her own terms. For example an in-depth interview or analysis from a contextual perspective provides insight of real problem. So if you understand, your first stage is natural setup and the user. So that if the designers and researcher has to correlate that.

Next what is the meaning going behind? So everything might not be tangible, intangible meaning and next is the finding the real problem that can be identified in the next stage. So for example this is a red dot award winning design. So they have, designers have designed a button, redesigned a button for elderly. So it performs the same task. So it is a button of shirt and it looks, look wise also it is not very drastically different.

So from button it does not go to hook or Velcro. So it is still a button. But minor change is creating this button so unique and so user friendly. So this button is ergonomically designed and little tweak in the button so that the grip is better. So it might not be even be a problem for the other demographic segment of the user group but for elderly grip is a real problem. So their grip becomes feeble and then that exactly is the problem.

So through the natural setters by seeing how they perform the particular task and what exactly the problem is, based on that a very minor tweak in the product is creating this design so unique.

That is why it got the red dot award. So this is how the final button looks like. So it is not very drastically different from what the existing solution is but it changes the user experience a lot.

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- Characteristics
 - ✓ The Use of Multiple Tactics:
A bricolage is "a pieced-together, close-knit set of practices that provide solutions to a problem in a concrete situation." Something constructed or created from a diverse range of thing.
 - The idea of bricolage implicitly suggests that qualitative researchers will employ a range of tactics that are both particular to the context being studied, and of course appropriate to the research question(s) being asked. ✓

Now the next characteristics is the usage of multiple tactics. So it might not be just one way of looking at things. There can be a same task or a different task to understand what is the phenomena going on, why people are doing it. So multiple strategy to look at the same problem should be applied by the user. Sometimes user just observe the people to how they are behaving. So they do not even give them any task. Sometimes the tasks are very well-defined.

So sometimes designers tell them to perform this task. And sometimes designer just observe how users are behaving. So it can be very well delineated to just scattered and just an observation, just a photographic documentation or video graphic documentation or it can also be just a discussion and discussion within the natural setup why you have performed that and why you have done or it can be a detailed questionnaire.

So there are many tactics depending on what kind of user groups are, depending on the users. So some users might be very comfortable of doing a particular task. Some users might not be and what exactly you are trying to design. So based on the design need also it will differ. So it is very difficult to tell which tactics will work better and which tactics will not work. So it has to be a

designers decision to understand whether this task has to be very well defined or it will be just an observation. Or it can be a combination.

Always combination works better because from different typology of task different insights come out. So it is a bricolage, a piece, different pieces together, close-knit set practices that provide solution to a problem in a concrete situation. So this has been told by user researchers. Sometimes constructed or created from a diverse range of things. The idea of bricolage is implicitly suggested that qualitative researcher will employ a range of tactics.

Range of tactics, not just one that are both particular to the context being studied and of course appropriate to the research questions being asked. So one thing has to be kept in mind which is contextually you can create different, you can employ different tactics but all this tactics has to be contextually relevant. If you create just to increase the number of tactics few tactics which is not even contextually relevant.

And not even corresponding to the particular user group it might not help you to get any insight. So every tactics has to be contextually relevant. Why you are doing this, taking this tactics to interpret the behavior that has to be kept in mind and then multiple tactics will definitely help you.

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- Characteristics

The Use of Multiple Tactics:

✓ An example of a multi-tactic qualitative study may be seen in Karen Keddy's study of the experience of a hospital surgical unit from the perspective of the nursing staff.

✓ Rather than focusing on how nursing staff's productivity might be increased through design interventions, Keddy sought to provide a more holistic understanding of "the physical nature of nursing work and the physical environment from the nurses' perspective".

So an example of multi-tactic qualitative research may be seen in Karen Keddy's study of experience of hospital surgical unit from the perspective of nursing staff. This is an example of how multiple different strategies can help. Rather than focusing on how nursing staff's productivity might be increased through design interventions, Keddy sought to provide a more holistic understanding of physical nature of nursing work and the physical environment from the nurse's perspective.

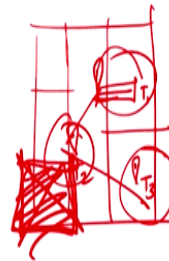
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- Characteristics

The Use of Multiple Tactics:

A wide variety of tactics were employed, including:

- ✓ Structured, in-depth interviews,
- ✓ Location mapping
- ✓ Photo-documentation
- ✓ Architectural inventories,
- ✓ Place-centered behavioral mapping
- ✓ Focused observations
- ✓ An image-based visual exercise called an experiential collage



He wanted to understand the behavior along with the social the context of the special context. So wide variety of tactics has been employed. So these are few tactics Keddy has employed. Keddy took the help of these different tactics. So one is structured in-depth interviews which is questionnaire and interviewing the nurses based on a very structured questionnaire based interview. One is location mapping. Mapping the location and it can be through trail mapping.

So you just observe where people are going, what task they are performing in different location. If this is the map of a hospital then where nurses are situated and what task they are performing and how this space is behaving in different area and how they are interacting within the different spaces. So that can be location mapping. Then photo documentation, just clicking photographs, observing how they are interacting with a particular space.

And it can be photo documentation, it can be also video documentation. Then architectural inventories. What are the architectural features are there and what are the products and what are the features and how these features are interacting with the user group. Place-centered behavioral mapping. So each and every different place, in different place how people's behaviors are changing. Then focused observation.

Particular place has been selected where the focus is required which is critical for the design. The decision has to come from the designers and a focused that area and how people are interacting with the particular space. That is a focused observation of a particular area is one. And this is an interesting tactic what he have included, an image-based visual exercise called an experimental collage.

This is quite unique for this particular task where he try to interpret how nurse's behave in the hospital. So this is unique in terms of this particular task. It can be some other kind of task which is unique to interpret that particular task and it has to be decision from the designers or the user researcher. And what unique tactic will lead you to the interpretation of a particular behavior of the phenomena which is happening in the natural settings. So this is how it looks like.

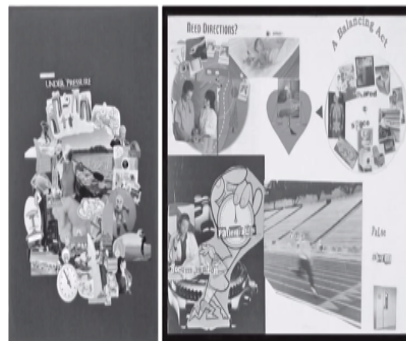
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- Characteristics

The Use of Multiple Tactics:

This set of data collection tactics focuses not so much on quantities of easily measured and known activities, but on the experiential qualities and conceptualizations of the nurses' work. As a result, this study was able to reveal the "hidden activities many nurses perform which are not measured or even included in such inventories as work sampling."

"insights into how a nurse actually feels about what she thinks and what she does as well as what it means to her . . . , a means of making different perspectives about the socio-spatial nature of nursing work visible."



So he have asked the nurses to create a collage based on their psychology within the hospital. So that gives a meaning making. So the first tangible things what he is observing that he can just

observe how they are behaving. But this intangible part why people are behaving like that. What is the psyche of the nurses and that to understand that because meaning is one of the intangible part which has to be understood by the researcher.

That is the tracks of the qualitative research and designer has to interpret that otherwise the design should not have the empathy to lead you to the next level of design. So asking them to make this collage helps him to interpret the psychology and he interprets the meaning of the intangible meaning why people are behaving, the nurses are behaving like that in this particular way. So these are few collages created by the nurses.

So this set of data collection of tactics focuses not so much on the quantitative data but it is the qualitative and the second layer of data which helps him to interpret what to give a better insight on this particular task.

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- Strategy: Qualitative Approaches
- ✓ Ethnography:
- ✓ Ethnographic research emphasizes in-depth engagement with site-specific settings, most especially through active and thorough observation.
 - ✓ Instead of taking people's answers for granted, you observe and try to interpret why people are doing what they're doing.
- ✓ Characteristics:
- ✓ context-rich detail
 - ✓ the reliance on unstructured data
 - ✓ a focus on a single case or small number of cases
 - ✓ data analysis that emphasizes the interpretation of "the meanings and functions of human action"
- (15)

So next we will discuss about the strategies of qualitative approaches. One strategy is ethnography, another strategy is the phenomenology, another is grounded theory which we are not discussing. If you are interested you can read more about the grounded theory, ethnography and phenomenology. The first strategy is ethnography. Ethnography, phenomenology these are quite similar. There are slight differences.

But they all fall under the qualitative research technique. Ethnographic research emphasizes in-depth engagement with the site specific settings most especially through the active and thorough observation. So ethno means people, graphy means study. So people study within a particular national setup is what ethnography is. Instead of taking people's answer for granted you observe and try to interpret why people are doing and what they are doing.

So many of the cases people will answer something but what they are performing from that there can be the answer might not be the true answer all the time because they have a psychological background. They might try to defend something what they are performing. So that has to be understood by the researchers. So what they are saying might not be the right thing. So that is why observing the people's behavior in a natural setup and interpreting the meaning why they are doing that. That is a very important part of the user study.

The characteristics, context-rich detail. So all the time what is the context of this behavior. What is the context of answering this question has to be documented. Just the answer, just the behavior will not make sense. For example while Ked was studying the nurses behavior he was studying according to the particular space in particular space why they are behaving. And also he wanted to infer what is the psyche.

And then from there why they are behaving in that way based on their psychological mind setup. Now that is why this context is very important. Then reliance on unstructured data. All the time this data might not be structured. Sometimes researcher has to let users talk and which might not be within the questionnaire. So it might deviate from the questionnaire and sometimes users might need to add some point. Researcher has to listen to that.

So it should not be always whatever the questions are just it will be multiple choice. It should not be, so there has to be a elaborative answer based questions and where user can express their free view. And sometimes it might not be even within the questionnaire which users want to say and always designers and researcher has to ask why they are doing it. So one question, question should not be yes or no question.

So if they are performing something, so designer should ask them why? Why you have done this? So based on this why questions if you ask why then lot of answers users will tell and which will be very important for the next stage design. Focus on single case or small number of cases. It is not a statistical research, qualitative research is different from quantitative research. In quantitative research large number of data set is very important.

If somebody is researching on the rainfall data or something related to people's economy or economy of a particular people and how many people are employed are unemployed then a large number of data set is required to get the number. Because here in qualitative research we are not dealing with the number, we are dealing with people's behavior. So in that 15 number of users study is a good number.


So you can study different research paper in qualitative research how many number of how many set of users they are taking. What is the best data set? But here the data set is not very high. The most important part is the in-depth research in each and every subject. So subject number can be maximum 15 or plus minus 5. So not less than 10 for a better understanding from each and every segment of the user.

And if the user segment differs then again it should be 15 for each and every segment. So 15 is a general thumb rule and common decided number. So if you study 15 people in in-depth manner and interpret their behavior that will be good enough. Because everybody's behavior will not differ if they are in a particular demographic setup, they in a particular similar type of user group. Their behavior with a particular user interface will not differ.

So it will differ if the segment group changes. So if you study a teenage just behavior to book a flight and elderly people's 60 years old behavior while booking a flight, that will differ. But 15 teenager's behavior towards while they are booking a flight will not have much difference if they are from a same place. So it might even differ if they are from different country or different language is an issue.

But if demographically they are falling under the same segment their behavior will not differ. So within rather than going broad into large number of data set in-depth study for only 15 user cases can be good enough if the study is detailed. Data analysis that emphasizes the interpretation of the meaning and function of the human action is the important part.

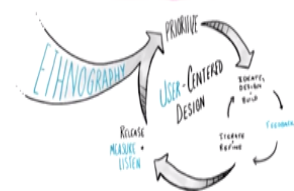
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- Strategy: Qualitative Approaches

Ethnography:
Ethnographic research emphasizes in-depth engagement with site-specific settings, most especially through active and thorough observation.

✓ The researcher is likely to employ participant observation. This term is frequently used to refer to a situation in which the researcher plays a naturally occurring, established role in the situation under study. For instance, the researcher's identity might be known by few or many, or revealed in more or less detail.



Now ethnographic research emphasizes in in-depth engagement with site specific setting most especially through active and thorough observation. So this is an important part, thorough and active observation, not the number of user group and site specific correlation with the user or the contextual correlation. So site does not mean only the special site.

It will be the correlation with the interaction between the product in terms of user interface how they are interacting with the digital interface or if there is a product with a digital interface how they are handling the product with the digital interface that has to be studied and correlating the context with the environment. The researcher is likely to employ participants observation. The term is frequently used to refer to a situation in which the researchers play a naturally occurring established role in the situation under the study.

For instance the researcher's identity might be known by few or many or revealed in more or less in the detail. So a researcher might tell them I am the researcher and I would like to ask you few

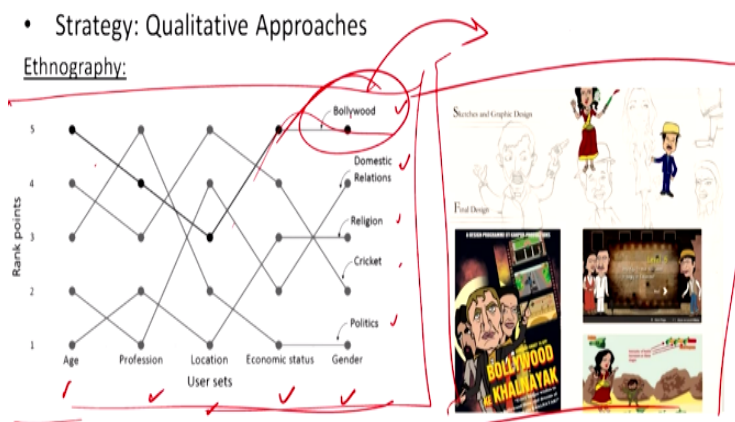
questions for a detailed guided technique and sometimes he might not. He might just observe the people and document silently from a distance to get a unbiased feeling of how people behave.

Sometimes if you introduce yourself to the users then their behavior might be biased because they will feel that they are getting observed and sometimes it is required, sometime it is not. And few cases there are this usability testing lab where there is one-sided mirror. So the user's perform the task interact with the digital interface in a one room and then designers and researchers sit in the other room where there is a one-sided mirror.

So designers can see how people are performing interacting with the interface but the subjects or the users will not get to know whether people are observing them. So it is like if this is the room and if this is the one-sided mirror and this is the other room where designer sit and this is where the users go and then through this one-sided mirror designer can see the users but user cannot see. They will perceive there is just a mirror but this is a glass for the user.

So this also changes based on the darkness. If this is dark and this is illuminated, they will see the reflection. So in this process the designers can observe the users and users behavior will be unbiased. So this is one of the ethnographic surveys example which has been done by me with one of my colleague.

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So we wanted to study what is what people in this Indian demographics based on their age, profession, location of user set, economic status, and gender what people want to see in the, what type of TV serials or movies people like. So it has been ranked and then data has been displayed like that. So based on age, gender, profession cricket, politics, religion, domestic relation and Bollywood. So these are few topics has been correlated and then it has been mapped.

Based on that the Bollywood has been selected as app development process, the feature of app development because many of the people were quite correlating themselves with the Bollywood. And then a game has been designed for Samsung smart TV application. The task was to design a TV application which can be game, which can be informative entertainment anything.

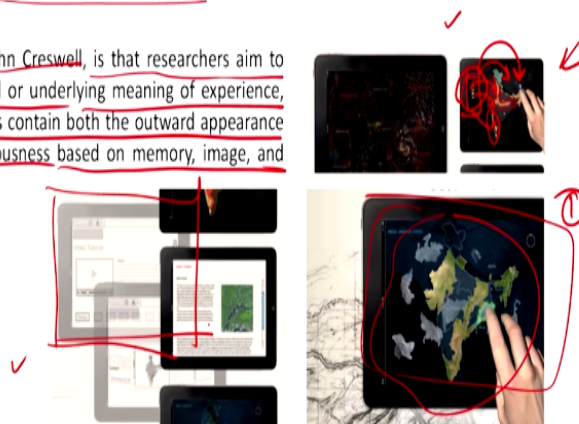
But based on this survey that what people watch and how they interact with the TV when they are sitting in front of the TV what do they need to watch and then there was some other situations in what time of the day they are watching. So based on that this has been selected and this has been designed. So this is published in this paper.

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- Strategy: Qualitative Approaches

- ✓ Phenomenology:

As described by John Creswell, is that researchers aim to clarify the essential or underlying meaning of experience, "where experiences contain both the outward appearance and inward consciousness based on memory, image, and meaning".



So another process of strategy of qualitative approach is phenomenology. This is slightly different from ethnography. As described by John Creswell is that the researchers aim to clarify the essential and underlying meaning of the experience where experience contains both the

outward appearance and inward consciousness based on the memory, image and meaning. In ethnography the emphasis is what people are doing in terms of natural setup.

That was the main emphasis of ethnography what we are observing people to do and it can be silent observation from far in the natural setup or they can come to the lab and interact with the interface because we are discussing about the user interface. They can interact with the user interface where designer slightly watch from the other side of the room where there is a one way mirror.

Or it can be very structured where designers come in front of the users and they ask them to perform some structured task. It can be flight booking, it can be interacting with an app. It can be any other thing. Or a structured questionnaire when they ask very structured question and also listen to the users if they want to add something. But in phenomenology what happens is the mostly the emphasis is in the meaning making, the interpretation of a phenomena.

So phenomena is observed and then the meaning why this is happening. So that becomes a phenomenological research. Example when we were talking about the nurses example when the nurses are behaving in a particular space how they are behaving that will be more closer to the ethnographic research and while the researcher is trying to interpret the psychology of the nurse through this collage.

And other techniques that might be towards more a phenomenological research when he is trying to observe the phenomena and trying to interpret the meaning of the phenomena. So phenomenological research is not it has a lot of emphasis on the meaning of part of it. So it is the next layer is much more important. Not just the observation and the truth what is happening. So this is an example of app development which we have done.

So the task was to design educational app for the school children and many of the task has been given to them, many of the observations were like they wanted to draw. So they like drawing something. So this haptic sensation was quite important. And many of the subjects like language,

science, or history and geography, social sciences, so these has been correlated where people are weak.

So many different tactics were there and what they like, like sketching, drawing and how do they like their education system. What typology of education will be more interesting. So based on all these different surveys a app has been designed. So this is the final app where the subject is selected as the geography was selected because of the observation of that particular school which has been studied. And then different ways of learning geography was designed.

So one is like a puzzle game because gamification has been done because they wanted, children were more inclined towards gamified version and games rather than formal classroom study. So these meanings has been deciphered through different types of tasks. So task like they were even asked to draw something and then different typology of task were there. So it was not a direct yes, no answer through that this decision has been taken.

In the previous example where the Bollywood has been selected, so that was a very structured yes, no answer and observing the people. But here because we were dealing with children, so they did not give a very direct answer. So psychology and interpretation of their action was more important so this becomes more of a phenomenological research but both ethnography and phenomenology is quite similar. So lot of tactics superimpose with each other.

So it is not a very different approach. So how you look at the things just based on that this differs. So if you look at the final design as well so they have this provision of coloring tools. So one process of sorting this puzzle and putting this puzzles within that and another was the coloring tool so they draw this areas of rice growing area and other things and then they just paint this through different color. So this color buckets are like legends.

Rice has a particular color, wheat has particular color, cotton has particular color. So they just fill this and which gives the experience of game. And there were lot of other interfaces like videos. So there were video lectures where interactive sessions are there. And then the rainfall and other things were shown as a video. So those adds the gamified learning experience. So this decision

has been taken based on the child psychology and what type of education they want to, what typology of learning experience will they prefer.

In the next class we will discuss of based on this data collection, strategies what are the other tools and techniques and how to represent these collected data and reduce the data and perceive the data and try to interpret the meaning in a different way and towards more the final design decisions. That will be discussed in the next class.