Applied Ergonomics
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Lecture – 29

So, welcome to this lecture, this lecture comprises of discussion of various research methods used in ergonomics. So, in the previous lecture we discussed about various tools and techniques used for ergonomic assessment. So, here some of the tools or we can say that the philosophical manner what are the research methodologies which are here to perform any research which is basically based on ergonomics.

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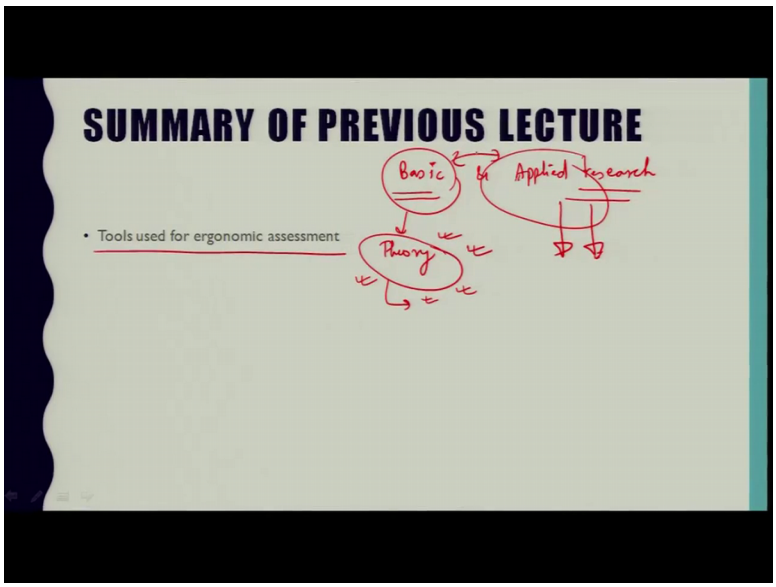

So, in series with that so as far as previous lecturer is concerned we covered various tools and techniques for ergonomic assessment. So, basically if you start with the research so research is basically 2 kinds of research are their basic and applied. So, in this basic, basic research the development of theory, principles and findings that generalized over a wide range of people a task and settings.

As an example like a series of a study is we can take an example that does the theory that as a people practice of particularly act activity hundreds of times. So, it becomes automatic and no longer takes conscious effortful cognitive processing and this applied

research can be defined as the development of any theory principles, that are basically those findings are relatively specific to a to a particular population and task and it is basically related to some kind of application that maybe application may be the development of any product or any system. So, there is a slight difference between these basic and applied research. So, there are various research methodology is used in ergonomics.

So, most important and most frequently used technique is survey and questionnaire.

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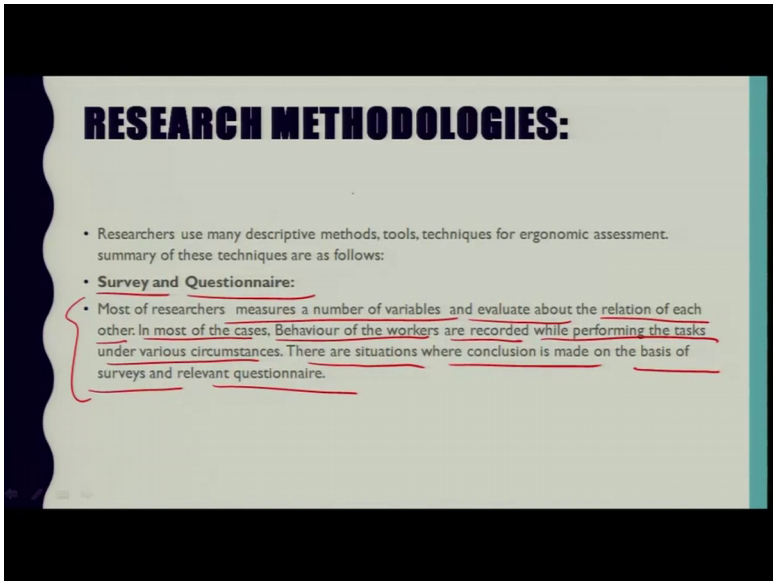

So, most of the researchers measure and number of variables and evaluate about the relation of each other, in most of the cases behaviour of the workers are recorded while performing the task under various circumstances. So, there are situations where conclusion is made on the basis of surveys and relevant questionnaire. So, the goal of scientific research is to describe understand and predict the conclusion made by predicting the relationship between variables.

So, in that context researchers use many descriptive methods which are tools and techniques for ergonomic assessment. So, the first kind of research method as a survey and questionnaire and second is experimental research methods.

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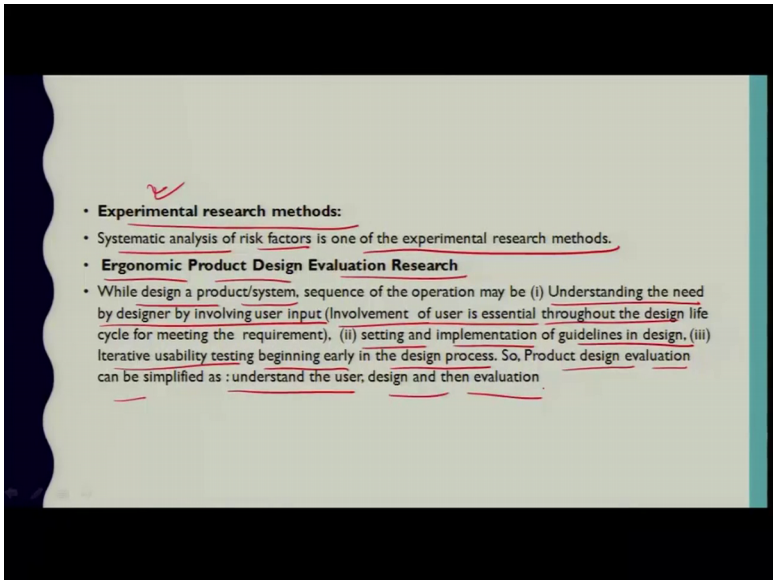

So, in which a systematic analysis of these factors is one of the experimental research methods. So, those methods are high hope and dst etcetera. So, another kind of research methodology is ergonomic product design evaluation research. So, while designing a product or any system the sequence of operation is, first we have to understand the need by the designer by involving user input. So, involvement of user is essential throughout the design life cycle for meeting the actual requirement.

Second is setting and implementation of guidelines in design iterative usability testing beginning early in the design process. So, the product design evaluation can be simplified as we have to first understand the user design and then evaluation.

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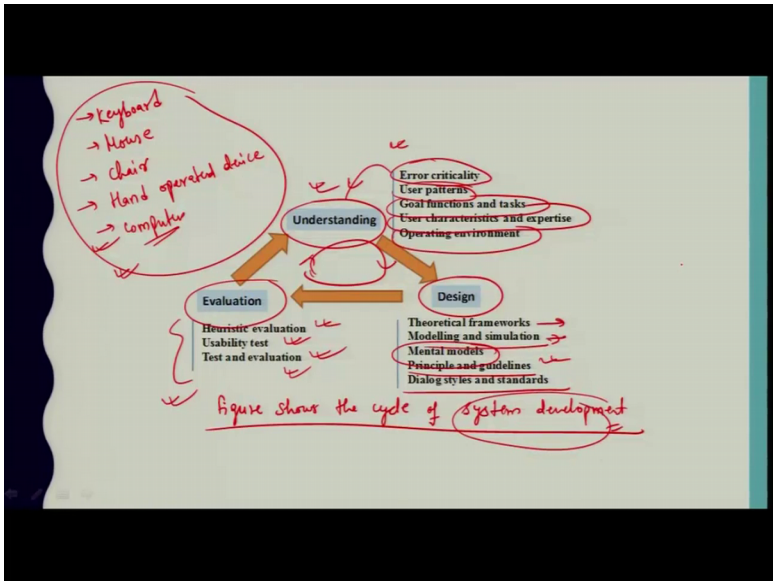

So, in that context this particular figure is showing the cycle of system development, here in this we can say that those understand the user design and then evaluate. So, understanding is the first criteria, second is then design and then evaluation.

So, this whole cycle is for system development. So, in understanding what factors come? So, error criticality we have to understand user patterns, goal functions and task user characteristics and expertise and operating environment. So, these all 5 factors we need to understand before initiating the system development and then theoretical framework is defined if before initiating its manufacturing of any particular work system. So, modeling and simulation is performed, mental models have been generated principle and guidelines have been assigned and dialogue styles and standards and then we come to the evaluation where the heuristic evaluation, usability test and test evolution test and evolution is carried out.

So, in that particular generalized cycle of system development. So, as the technological advancement is taking place newer products are appearing. So, we can take any product for I think sample and we can as a reverse engineering we can analyze that particular part and from where it has started and from where what is the current state of that particular product is. So, with the help of reverse engineering we can analyze and we can adopt the methodologies for generating a new system or any product.

So, the requirement of designing a product is it should have a user friendly, it should be user friendly and equid equipped with sophisticated designed. So, we can take any example in our surrounding like keyboarding system, including keyboard design or mouse design we can take, chaired design we can take an example any hand operated device. So, here example we can take these all; obviously, computer work stationery we can choose in order to analyze the product and its related aspects in order to understand the system development.

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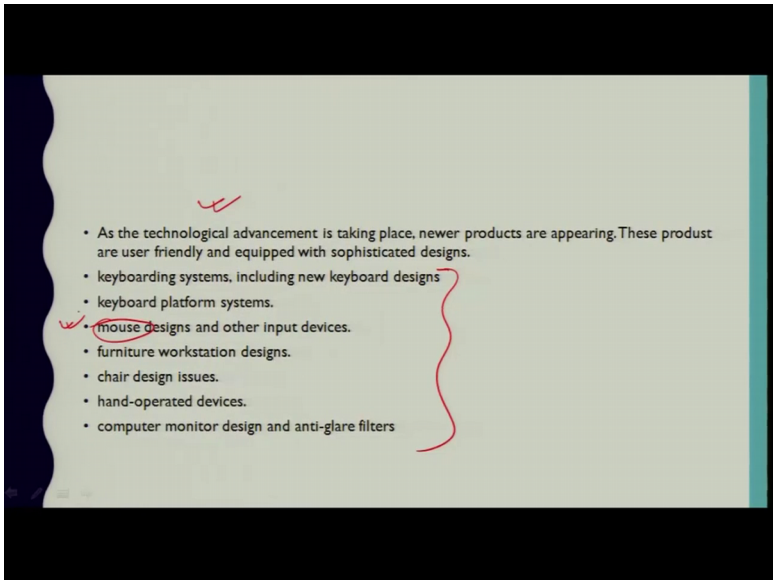

So, that is why this particular example I have put for you in order to take any, any particular example and check its development which has been performed in the course of time.

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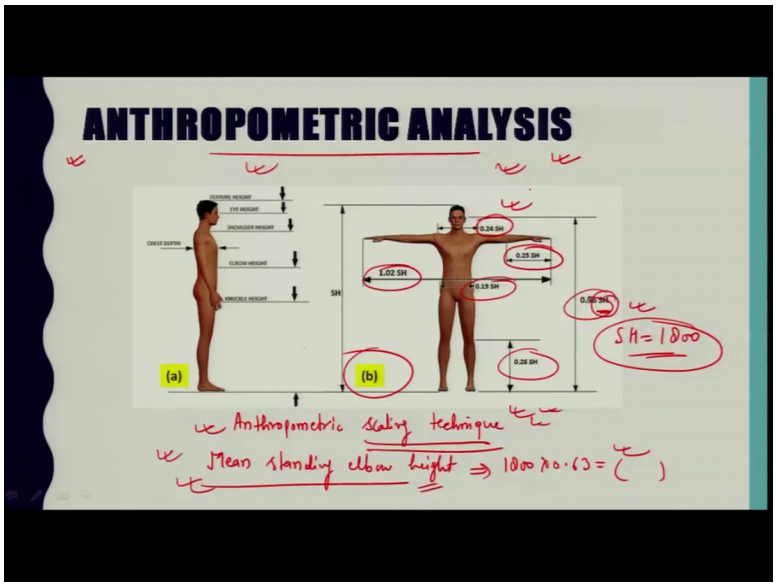

So, another thing that we need to understand that research which has been done in the ergonomic area especially in anthropometric area that kind of anthropometric scaling technique have been developed. So, in that context we can take this particular figure as an example to understand what this anthropometric scaling technique is all about. So, this if you are saying conveniently this is S H this is a stitch or height.

So, here this particular example is giving anthropometry, anthropometric scaling technique, it is used when designing for user source anthropometry is unknown sometimes we deal with the, we deal with the subset of a general population in which in which case is scaling technique can be used to simple proportional estimate of body dimension. So, let us say if we have to like a stich or height is defined as 1800 and now you have to predict the mean standing elbow height.

So, in that series how will calculate so this ratio is defined as a scaling law. So, that you can take help and with the help of this mean standing had can be predicted with the help of total stitch or height. So, here you can multiply with the factor and you will get the lean, you will get the exact mean standing elbow height for a general person. So, this particular figure is showing the linear body dimension expressed as a percentage of stature. So, in this way the techniques have been explored for performing research. So, this anthropometric scaling technique is one of the kind of research technique through which the particular proportion or a particular height or length can be predicted on the basis of this proportion that has been estimated by, previously by some researcher.

So, in general when we perform any experiment so there is a generalized steps that we need to follow. So, like in any if we take example of analysis, analysis of any ergonomic system. So, in research as far as experimental research methods are concerned.

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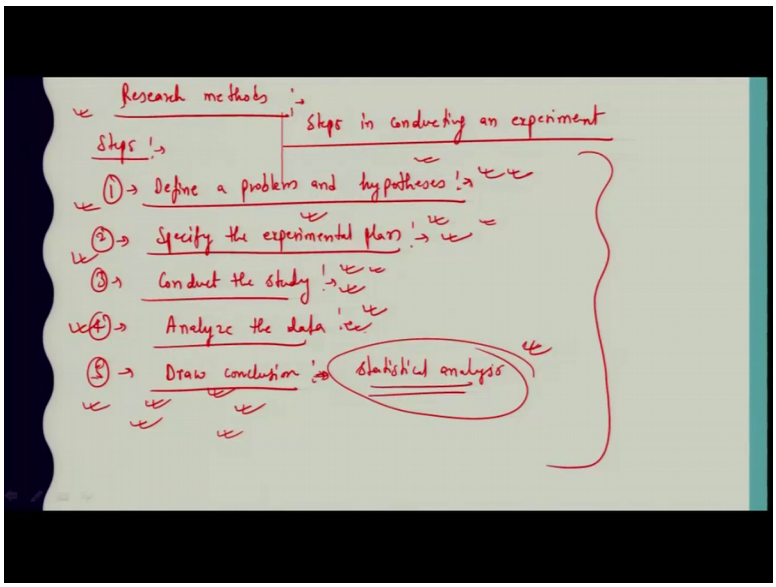

So, there are several steps in conducting an experiment. So, those steps I am defining here. So, that in a general way that can be taken as a, as tool for performing or conducting any experiment in regards with designing any work station or any ergonomic system.

So, here basically there are 5 steps in conducting an experiment. So, this particular experiment involves looking at the relationship between casual independent variable and resulting changes in one more, one or more dependent variables which are typically measures of performance workload repulses or other subject is evaluation. So, the first step in, like a steps in conducting any experiment, first we define problem and hypothesis. So, in that defining a problem and hypothesis researcher first hypothesize relation between a number of variable and then sets up experiment experimental design to determine whether a cause and effect relationship does in fact, exist.

So, in order to define the cause and effect relationship this particular hypothesis is defined in the form of defining number of variables existing in that particular problem, the second is specify the experimental plan so in that specifying the experimental plan consisting of identifying all the detail of the experiments to be conducted. So in that defining the independent variable is in important part of creating the experimental design. So, which independent variable do we manipulate and how many levels of each for example, we might decide to examine the performance of 3 groups of workers, those on a day shift on a night shift or in between alternating and those alternating between shifts.

So, this things we have to defined as an independent variable and the third is we have to conduct the study. So, the researchers obtain participants for the experiment develop material and prepares to conduct the study, like a if a particular person is ensure can I aspect of the study. So, it is difficult to perform a very small experiment a pilot study. So, before conducting the entire real study so after everything is checked through a pilot study the experiment is carried out and data is collected.

The fourth is, fourth step is analyze the data. So, here suppose you would had, you would have a set of numbers representing the key stroke errors for the people on changing work shifts a set for the people in day shift and a set for the people for night shift. So, data are analyzed using both descriptive and inferential statistics to see whether they are

significant differences among these groups or not. So, data analysis is also very important in that context. So, the fifth step is you have to draw some conclusion, in that based on the results of statistical analysis the researchers draw some conclusion about the cause and effect relationships in the performed experiment.

So, at the simplest level we can say that whether hypotheses were supported or not. So, it means to determine whether this particular hypothesis that we have drawn is supported or not. So, in applied research it is of an important to go beyond the obvious. So, whatever the results are coming we have to draw our own conclusion and it should, it may be a similar to what is existing or it may not if it is somewhat distinct what has been found so it is a new finding and then it is called as a research.

So, identifying underlying reasons whether it be, whether it may be coming in the psychological or physiological. So, the development of useful principles and guidelines emerged out when this particular research is used to perform. So, in that way these are the 5 steps in conducting a particular experiment. So, this may be useful for any experiment or in designing any particular thing. So, with this I am closing this lecture I hope you will have found some, you have found something distinct then what you know and till then next, till the next lecture continues goodbye for now.

Thank you.