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**Course
On**

Educational Leadership

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Lecture 23: Educational Research and Pedagogy

Welcome viewers to this NPTEL course on education literacy, so today I will discuss about a new topic that is education research and pedagogy.

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So what do we mean by Education Research and why it is important for pedagogy, and what is the different dimensions of pedagogy, how would these two concepts are interrelated, so today we will discuss elaborately about this. Now let us have one question.

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"Why" of Educational Research ?

Reasons :

1. Development – (Individual & Social , across the levels/groups)
2. Accountability – (Education being a Public Trust involves-
Lot of investments i.e.,
 - a) Edn. spends a lot of tax payers' money
 - b) Time
 - c) Human Resources



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That is why do we need to have education research, what is the, why it is necessary in order its importance, let us discuss about that. So primarily there are two reasons.

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One is the development reason, another is the accountability reason. Development reason is the fact, as a result of educational research we are likely to bring the development in the society, that is the education research results in bringing the development both at the individual level and the social level, and at all levels of education and the professions and as well as all across the groups. So educational research.

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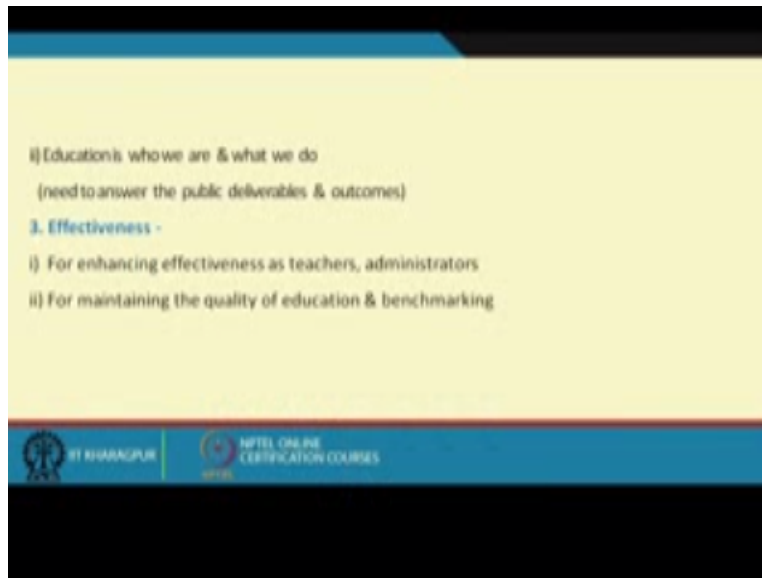
The outcome of educational research is that the development, it brings development in the society at different levels. Now second thing is that accountability, another aspect is accountability, so as because education is a public trust and education is an enterprise, education is the public enterprise hence it involves lots of investments.

So lots of investments in terms of not only money, taxpayers money but in terms of time, in terms of human resources, in terms of infrastructure, in terms of other resources as well, so as because it involves a huge amount of public money and investments etcetera.

Hence we are accountable to whom means the people who are the, who are engaged in education, in industry education process, educational institutions or, we are, we the professionals, we are the part of education sector so we are directly or indirectly we are accountable to our stakeholders and to the society at large, so these are the primary reasons.

The development, as because it is, it brings the development and second is that as it involves huge amount of public money and investment, hence we are accountable to the society and the stakeholders. So for that reason we know education, with education professionals, with the teachers, with educators, with the students are bound to do educational research. Then another thing is that.

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Education is who we are and what we do, so that is why we need to answer the deliverables of our education system, the deliverables of our curriculum, of our pedagogy so, and we have to give an explanation, we have to give the justification for what we are, what we are doing and why for we are doing, for whom we are doing, so we have to answer all these questions.

So that is why education requires, our educationists, our education, our educators, they are bound to answer these questions for big questions are about the public deliverables and the outcomes, and educational outcomes as because it is an human enterprise, it is an huge enterprise which involves public trust, public money, taxpayers money and time, investment etcetera.

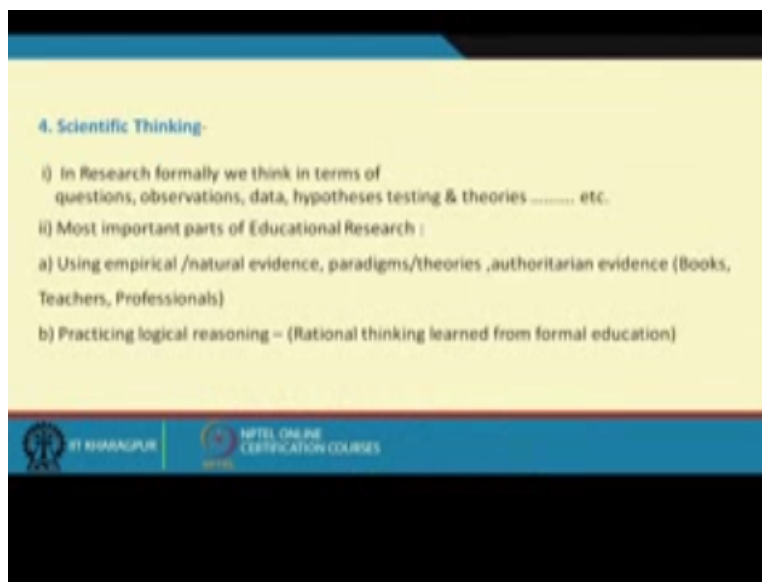
Third thing is, the third reason is that yes educational research also focuses on the effective measure. That is bringing effectiveness, bringing effectiveness for enhancing our impact, our competency, our effectiveness as the teachers, our effectiveness as administrators, our effectiveness as the students as well students, teacher educators at all level, it that means it focuses on bringing the effectiveness or improving or enhancing our competence. Hence we need to do educational research, then for maintaining the quality of education and benchmarking. So unless and until we do the research how can we justify.

How can we examine, re-examine, validate, like whatever practices we are adhering to we are sticking to our really successful, or really valued, or really fruitful, or you know it is a feasible, so we need to examine, re-examine and validate our own practices, pedagogical practices,

administrative practices, policies, curriculum, content, everything from time to time to update it, not only to update it, to revalidate it.

So, and that way we can bring the quality education in our, in our system, in our education system at different level and we need to update our curriculum content, we validate it and make it as per the international standard, global standard, and we can set the benchmarking, benchmarking of the quality education. Then again education research also focuses on bringing scientific thinking.

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4. Scientific Thinking-

- i) In Research formally we think in terms of questions, observations, data, hypotheses testing & theories etc.
- ii) Most important parts of Educational Research :
 - a) Using empirical /natural evidence, paradigms/theories ,authoritarian evidence (Books, Teachers, Professionals)
 - b) Practicing logical reasoning – (Rational thinking learned from formal education)

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In our attitude, in our approach, so scientific thinking in the sense that when we would like to engage our self in education research definitely we have to be very logical, we have to be very rational, and we must adopt a scientific approach and attitude towards any concept, any concept, any content, any pedagogy, any approach for proving it, for justifying it, for examining it, for evaluating it in a very logical and rational way.

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So in research formally we think in terms of, so say it is a part of, you can say it is a practice, it is a part, it is, you know philosophy of you can say educational research that we need to think scientifically, we need to think critically, we need to think rationally. So in research formally we think in terms of different types of asking different questions, doing the observation, the collecting the data, analyzing the data, formulating hypotheses and testing and experimenting and testing the hypothesis. Then also we also test or verify and re-examine the already the existing theories to improve it, to critically evaluate it, to revalidate it or.

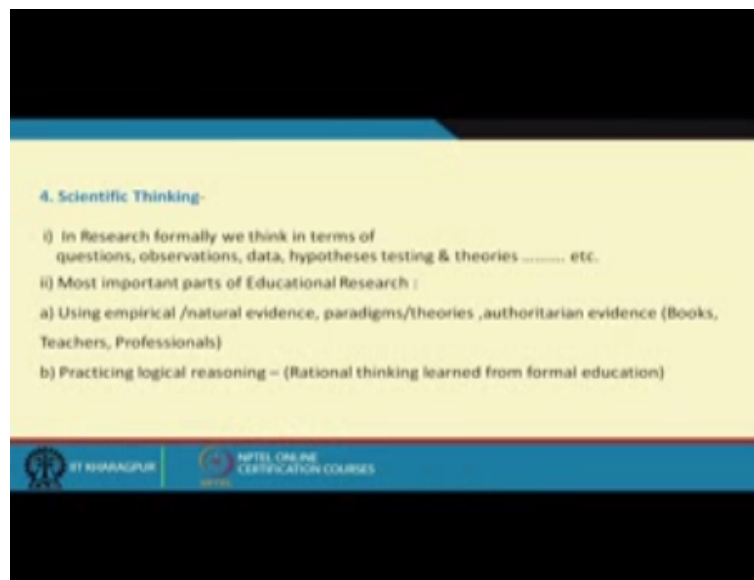
We need to re-examine this, we have to construct the new theory etcetera. So research that consists the, research is the, it brings a formal language in education to ask different types of questions, to make the observation, to collect the data and to make it as scientific, as objective, as rational as possible in order to you know verify its efficacy, verify its possibilities, the probabilities, the causality, the correlations and on the basis of that too we need to test the hypothesis that we frame or we assume and re-validate the theories or maybe that we construct the new theories.

So most important parts of educational research are like we were using the empirical data or natural evidence. Sometimes we, suppose we have introduced a new concept and we want to experiment on it so we can collect the empirical data, that means physically in the reality context, the real setup we administer it, we examine it, we conduct the research and collect the empirical data. So by using the empirical data and methods we want to prove it, we want to validate it.

Sometimes it happens that we also collect the natural evidence, natural evidence from the natural setups and from the natural context etcetera.

Which can be re-examined also. Similarly we also go through the different kinds of paradigms which have already been established and we want to retest it, similarly we want to re-examine the theories and adopt certain theories to revalidate it, whether it applies in our case or not and if not why? So similarly some kind of authoritative evidences are there.

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In terms of the books and teachers, books or resources, materials and the teachers are those who have been practicing the things for the long time and the professional concepts, there are practices, there are theories, etcetera.

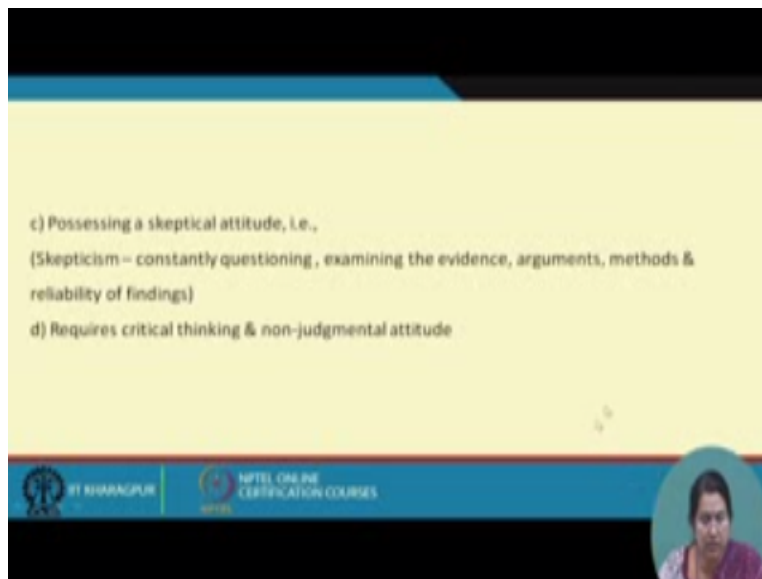
So we use this kind of thing that in terms of collecting the data from the empirical source, from the natural source, from the different theories which have already been developed and from the different authoritarian sources. Then again practicing the logical reasoning, rational thinking landform because a scientific approach to research which advocates for adopting the logical thinking, whatever it has been given to us or whatever we have identified.

We have conceptualized, we need to analyze it more rationally, more logically by analyzing its sub-dimensions, subcomponents and trying to find out the pattern of relationship with it, so you

can say logical thinking, rational thinking is the basis of educational research and in the process of formal and informal education.

Actually we have gradually adopted it, we have gradually learnt how to think rationally, like how to think logically or logical analysis. So again our education research also requires to possess a skeptical attitude, that is skeptical attitude, that is to be very critical, critical in the sense that not cynical, but to adopt a critical thinking approach, like constantly questioning, examining the evidence or placing the arguments, hiding the dialogue and trying to prove the methods in different situations, then trying to find out the reliability of the findings and whether the, these findings can be generalized in different context or not, so that is called the concern research aptitude or the skeptical attitude in the sense that to be critical, that means developing the critical thinking, so you can say that.

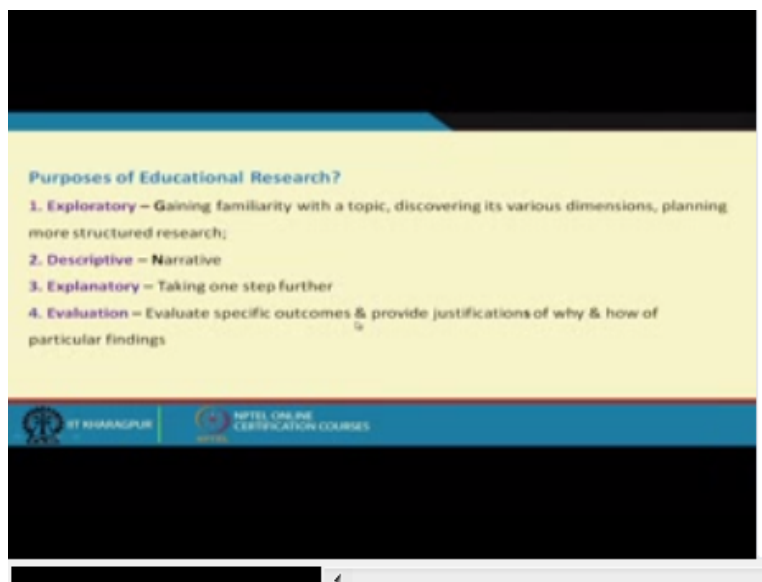
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Education research it requires a critical thinking and non-judgmental attitude, that means we should not have any preconceived notion or bias, like yes it is going to happen in this way or that way, so sometimes what happens that is the on research we do take the null hypothesis, null hypothesis means it nullifies all our assumptions or preconceptions. So our educational results

also requires critical thinking, skeptical attitude in the sense that to evaluate, to constantly to examine the evidence, to place the various arguments and non-judgmental attitude without having any prejudice, preconceptions or notions we have beforehand.

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So the, basically what is the purposes of educational research? Primarily we can categorize into the four categories like purposes like exploratory, so sometimes we conduct the educational research which are exploratory in nature in the sense that we want to gain more familiarity with the topic discovering its various dimensions, planning more structure discipline. Suppose a new concept has emerged in the field of education like suppose a personalized learning, a personalized instruction, or you can say critical pedagogy or innovative pedagogy.

Or any kind of terminology which were we were not familiar with and I guess emerged in the 21st century, the curriculum content or the educational context, so then we, if you would like to do the research for the research on this concept we need to explore it, explore the concepts,

explore the existing theories, explore the empirical works done in that field, so for gaining familiarity with a new topic, new concept, or discovering its various dimensions we can also engage our self in exploratory research.

So second is that descriptive, so descriptive research is primarily of narrative type like when we're engaged in conducting historical research, that means research which is already taking place and in certain disciplines and we don't have any control over it right now, but we can explore it that is in terms of narratives which already exists in that domain, so we ended a descriptive research, a temporary primary survey kind of research is descriptive research.

Then third category is the explanatory research, that is taking one step further, that is, maybe that the concept has already been examined, evaluated and validated etcetera in empirical context, but we need to further explain it, further examine it, re-examine it to find out whether it is applicable in our context or not, or can it be generalized or not, or to what extent it can be generalized. So for further explanation or we can say moving one step ahead or going further we can also adopt explanatory approach to our educational research.

Then fourth is an evaluation, evaluate the specific outcomes like as a matter of fact because of some you know some intervention program or some kind of new curriculum has been introduced, or some kind of you know teacher, teacher education program has already been done, after the program has been conducted then we often try to evaluate its effectiveness, evaluate its efficacy like.

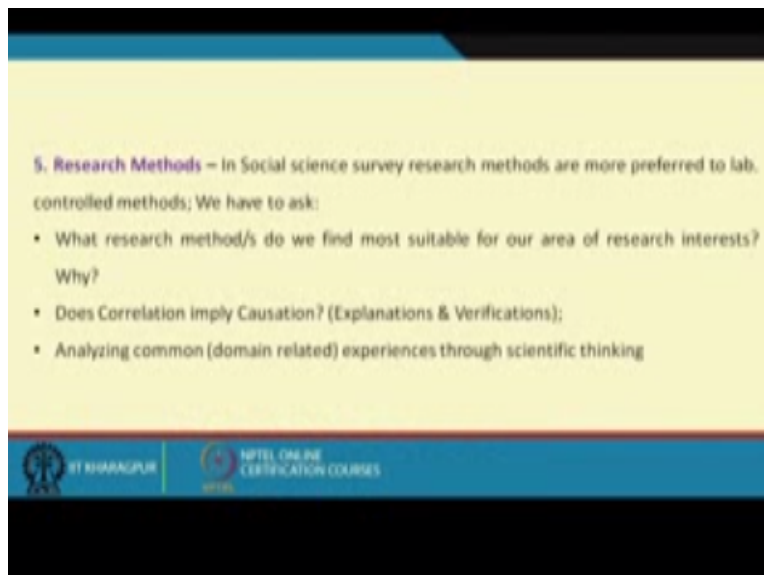
For example flipped instruction, flipped classroom, it is a new concept in the pedagogy, so I suppose you have already used it, introduced it, practicing it etcetera, but after some time now we need to evaluate its efficacy and effectiveness in terms of going back to the whole process and assessing the students performance, then asking questions to the teachers and evaluating the materials etcetera.

That is evaluate the specific outcomes like whether, we want to ensure that whether this flipped instruction flipped classroom has really given us the results or not, and to what extent is the outcomes are positive, constructive and useful for us, and provide a justification of why and how the particular things, and if in case suppose in one case we got the positive results or constructive

outcomes but in other situation we could not get it, then we need to justify, so we need to verify it like why it has not happened in other situation.

Why it has happened in a particular situation, what are the co-factors, what are the other variables that you know that are found to be conducive in that context, so we need to evaluate all this factors. Then terms of research method, there are different kinds of research methods are there so in social science primarily we stick to adaptive results, survey results or descriptive kind of results, because sometimes what happens we do not have the control over the reality which has already happened or we cannot control so many other social variables, so that, sometimes we prefer to adhere to the survey kind of research into, in place of laboratory research.

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5. Research Methods – In Social science survey research methods are more preferred to lab. controlled methods; We have to ask:

- What research method/s do we find most suitable for our area of research interests? Why?
- Does Correlation imply Causation? (Explanations & Verifications);
- Analyzing common (domain related) experiences through scientific thinking

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Because in laboratory research the variables are very much controlled and we have to adhere to certain conditions, experimental condition etcetera, but for, so in social science finally even though we stick to survey research method but there are also other options available, and we can, we can verify, we can examine or we can redesign our proposal and research problem in such a way.

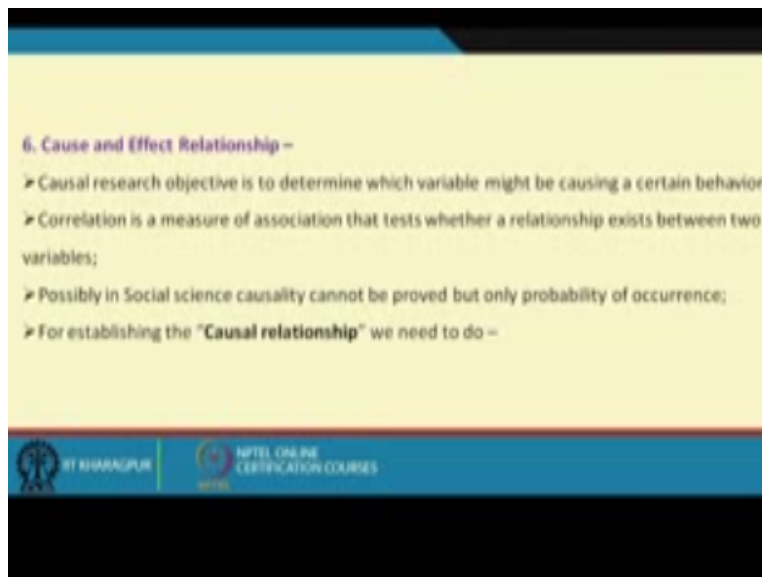
So that we can adopt different kinds of research methods. So then we have to decide what research methods do we find more suitable for our area of research interest, like whether we are interested in social sciences, or in physical science research, in pedagogical research or in you know a managed education management disorder, what type of research interest do we have right

now and for that matter we need to find out the suitable research method for that. So therefore we need to ask many questions with regard to that, not only with regard to the research methods.

But also the other aspects like when we select a such problem what are the variables and whether these two variables you know it shows, it predicts some kind of co-relation, some kind of causes, some kind of association or not and how to explain it, how to verify it, so and in order to verify the kind of relations so what kind of what, so what method right method we should adopt, so in analyzing the common domain related experiences through scientific thing. Besides these things also way we can reduce the limit.

And also analyze the common experiences that, the classroom experiences that student teacher, student interactions or the peer group interactions, or you can use the collaborative learning situation such as the common experiences also, learning different experiences so we can also analyze it in a very scientific way by adapting the scientific approach, logical thinking, and rational thinking. So another thing is that as an outcome of you can say education research the cause-and-effect relationship is also there, like when we select.

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A research problem obviously it involves 1, 2, 3, 4 variables, 2, 3 variables. Some variables are independent and we want to see its impact on other variables, dependent variables, so somehow or the other way these variables are related and it often exhibits, shows some kind of cause-and-effect relationship so then how to interpret this cause-and-effect relationship, how to explain

these cause-and-effect relationship, because of cause and research objective is to determine which variable might be causing the second certain behavior, like if we select a cause, a kind of a prior search problem which involves causal relationship.

Then how to justify it, how to verify that this variable is causing the other variable to react or respond in a particular way, so in that way we have to select the research objective like that, like for example smoking causes cancer, for example we have taken a research that smoking causes the cancer. So then whether the smoking behavior and the incidence of cancer in case of the individual, whether these two variables are related as the cause-and-effect relations, cause-and-effect variable or some kind of co-relation is there or it is just simply coincidental or any other co-variables are also there.

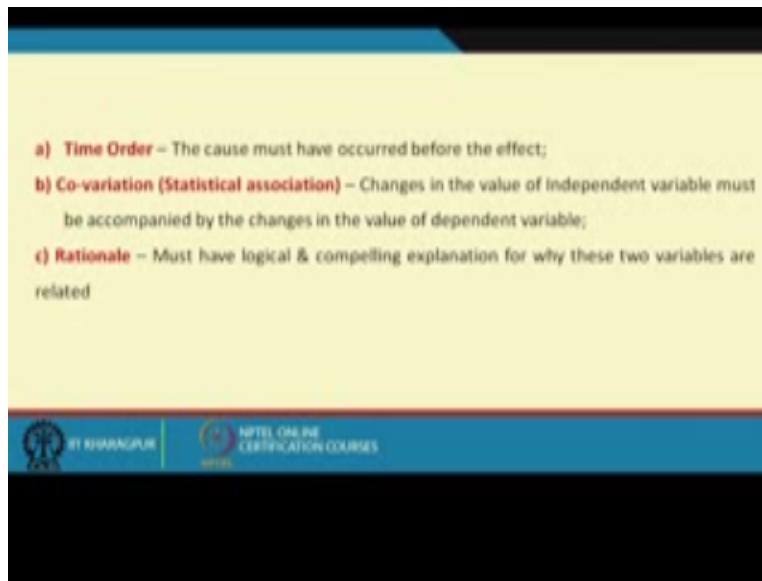
So correlation again, so in social science research is a very difficult to establish that it is the cause and it is the effect, so you know it is very difficult to establish the cause and effect relationship between two variables in social science research, because we as because we cannot control so many other variables and so we cannot be 100% sure about one is the cause and the other is the effect, so rather we assume some kind of probability of occurrence.

So what is the percentage of probability of occurrence or co-occurrence of these two variables, hence you can say correlation is the better measure of association, so correlation is a better measure of association that is whether the relationship exists between the two variables. So in that case as because we cannot hundred percent sure enough to prove the cause-and-effect relationship, they are better if we try to find out the co-relation. So co-relation, what is the degree of co-relation? It is, whether it is 0.8 co-relation, 7 co-relation, or point zero 5 co-relation or one point and some one point zero co-relation is a full co-relation, full positive correlation.

So we better stick to the co-relation method for finding out the association, so possibly in social science causal, causality cannot be proved but only probability of occurrence takes place, like what is the percentage of likelihood that these two variables occur or co-occur together. So, however for establishing the causal relationship like we intend to find out the cause and effect relationship, like for example suppose the teaching method, teaching method like traditional teaching method, flipped instruction method and its relationship to students learning outcome, or the students achievement.

So are we, if you want to find out the whether this causes the good impact or if that causes the good impact and whether these two are causally related to each other, so in order to establish the causal relationship we need to be further kind of analysis, like what are these things, so we need to conduct the time series, times series study.

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That means longitude, we have to engage out in longitudinal period study for a long period, for a long time we have to conduct the same experiments, the similar experiments again and again and again, so time order series experiments, that is the cause must have occurred before they fit. So in order to establish the cause and effect relationship you have to be very particular that the cause has already taken place before the effect, it is not the reverse, so for a over a period of time in the long run or in the longitudinal studies if you can establish that yes every time.

We conducted we were getting the same result. Similarly another technique is core variations, like as we have already discussed that in social science research we cannot control many, so many co-variables other variables, hence here in order to establish a cause-and-effect relationship then we will adopt some statistical technique, some statistical analysis to eliminate the other variables of influence and to establish, further establish the relationship between these two variables, cause and different variables, so that is called the co-variations.

That is the core variation to find out the statistical association, like the changes in the value of independent variable must be accompanied by the changes of the value of the dependent

variable. If you try to observe the one independent variables impact on that particular dependent variable then we have to, we have to eliminate the other co-variables that influence other co-variables inference from that dependent variable through statistical analysis that is analysis of covariance is also there.

So in that way even though we won't be able to be 100% sure but yes we can adopt multiple methods and approaches to establish the cause and affect relationship. Similarly we have to justify the rationale, the, justify the logic behind it, that must have the logical and accompanying explanation for why these two variables are related. Like if you are going to observe the cause and effect relationship between the teaching methods and student's achievement etcetera and if in one method.

We are getting the better result then we have to conduct it for a number of times, in number of situation, number of contexts and number of sample groups to re-evaluate, to really examine it, but every time we conduct a different situation over the period of time we are getting the same result, so there may be some causality, there may be some relationship. Moreover by analyzing the statistical techniques also we can also further establish it.

Further established, so we have to add even though we are getting the statistical result we should not be happy, we should not be satisfied that it proves to be a justified, it proves to be valued but we have to analyze the logic, the rationale behind these two things so our logical explanation is another way of you know analyzing the cause-and-effect relationship.

So again a non spuriousness, non spuriousness is that like that means in some situations this impact, maybe that this impact of independent variable on the dependent variable may be a huge impact or very you know the large, or you can say superfluous in the sense that is a huge which we might not have expected earlier also, so it must be established that the independent variable X, only X causes the changes in the dependent variable not other explanations, like our, even though.

We have got the other interferences, even though we have adopted the cornices of co-variance, even though we have tried to control the other variable, two intervening variables still then whether there is any spuriousness like spuriousness in the data. So in that situation we have to

check it again whether the, you know data results are very much queued or not or it's a normal, or how it is being distributed.

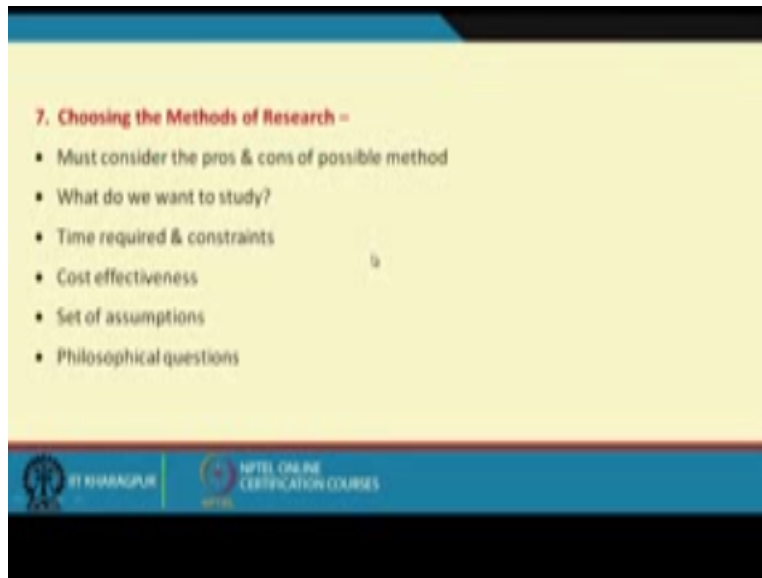
So we have to verify non-spuriousness also, and the co-relation, and the co-relation does not imply the co-occurrence, even though we get 0.7 or 0.8 co-relation between two variables the co-relation is, it does not ensure us that yes, co-relation is that some kind of relationship is there but there is no such a causation, cause, no such cause-and-effect relationship, so co-relation does not always imply the causation, so other factors besides.

Cause and effect can also create the observed co-relation, maybe that there is no such direct cause-and-effect relationship, it may be some kind of instant, some kind of relationship exists. For example creativity is the function of self actualization of the individual, so how to establish that creativity causes the self activation? So creativity is the cause and self actualization is the effect, so we cannot establish.

We cannot establish the cause and effect relationship in this context, yes we can say that creativity and self extensions are highly co-related and in you know, in a number of studies the number of occasions, the number of situation and with different sample groups we are getting it, we are getting the results of the high co-relation, but that does not mean that these are cause and effect.

These are related because of the cause and effect relation, so we cannot answer, certain variable, certain concepts are very difficult to establish the cause and effect relationship. So second, the next is our choosing the methods of.

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Research, so when we are selecting the research problem, identifying a research problem you have to be very particular, very serious about selecting the appropriate research method for verifying it, so we must consider the pros and cons of the possible method, if you have to, if we have selected a research problem and pedagogy or in trust management or in a learning material or mathematics difficulty, learning difficulty.

Any problem is select then we have to find out which method will be most suitable, we can usually, you know we can adopt anything, any method but that does not, that will not help us in proving that exactly the, this is the impact exactly, this is, we cannot mark actually the result of the outcome.

So that is selecting the right method, proper research method is also another important aspects of education research and we must consider the pros and con of the every method, all of the every method, like suppose if you compare the survey assessment, that is maybe easily done but you know there is the validity and reliability of the findings may not be that potential.

So and if you stick to the experimental method, experimental method is very good but with this kind of problem it is very difficult to conduct the experimental research. So what we want to study, so it primarily depends on what we want to study, how much time It requires so whether it is a like whether it is a, we have the time limit of you know six months or one year or one and a half year etcetera, what is the time required, a required answer within that time limit and if this

topic is very large, very fast area is very broad and so while selecting a research problem, identifying the problem.

Then how much time it requires, what are the constraints that we are going to face in terms of the resources, in terms of you know in terms of not being feasible or possibility of conducting this research in different context etcetera, then cost effectiveness, how much it incurs the, how much cost you know in terms of resources, in terms of the money, in terms of physical infrastructure, in terms of equipment, in terms of chemical, in terms of manpower and while calculating whether it is a cost effective or not, so cost-effectiveness, then set of assumption.

I mean while selecting the problem what are the set of assumptions we are making and this assumption, and what do we predict whether it is going to be successful or not or whether we are getting a particular kind of result, and even though our assumptions are going to be proved, going to be proven or successful then in which way it is going to help us after investing so much of time, effort, money etcetera, money, manpower etcetera.

What result it is going to give us and how it will be helpful for us in different contexts, in our workplace or in our classroom, in our education situation, where it is going to be applied so, and the philosophical questions and often we should not be very much say you know fascinated by the, by philosophical questions like whether you know whether democracy is more a, democracy is more successful, more useful and more positive and constructive in terms of, in terms of you know more creative and innovative thinking or not, or any other form of government or any other form of administration will be more successful or helpful, so by, while selecting this kind of philosophically highly abstract and philosophical questions.

You can see it is not, it is unfeasible, so it is not possible, it is not possible to conduct research, it is really simply wastage of time and resources. So with this we just, are just finished the part of the education result and thereafter we will further discuss about this other aspects dimensions.