INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI

NPTEL

NPTEL ONLINE CERTIFICATION COURSE
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Science, Technology and Society

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A very warm welcome to this CSS MOOC course on science technology and society it is a course within the discipline of sociology as a whole and in particular sociology of science and technology but when we look at courses like science technology and society.

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We must look at the way these 3 forces are prediction naming the science technology and society have evolved over time and across space, science technology and society this sub discipline or is consummation of various other disciplines namely philosophy of science history of science sociology of science and partially philology of science when we talk about philosophy of science history of science sociology of science and of course philology of science is a reason discipline

which I am not going to cover much in fact I will be dealing with science technology and society from 3 vantage points.

Namely physiology of science, history of science and sociology of science okay before entering any formal discussion on STS I repeat I retardate the point that we must look at the thematic preliminaries.

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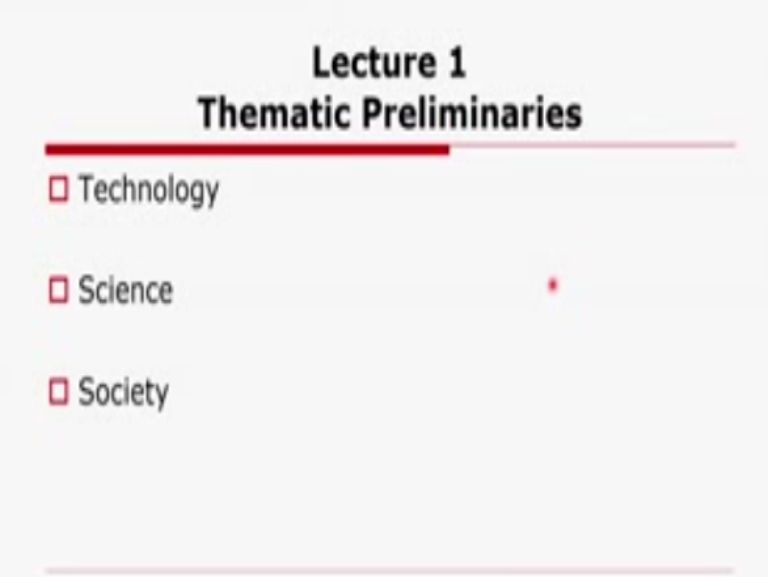

Which are very much implicit in the relationship between science technology and society? Now what is technology, what is science what is society? Technology the way we understand always predate modern science people very often think that you know science is prairie to the formation of technology but history of science philology of science, sociology of science all range reiterate the point that technology always predates model science we can give numerous examples but for the time being what we want to look at that how technology what are the contours of technology.

How a technology as evolved what are the theoretical predicaments of technology similarly we also look at science and it is intellectual and political contours and also the relationship of technology and science with society okay then what is a technology. Technology if we look at from the vantage point of historical sociology political economy philosophical and topology then we always finds that technology is the medium through which human beings interact with nature.

When I say nature it includes both natural and social phenomena the way I want to look at technology this is the perceptive that I am is done from historical sociology, politically economy philosophical topology, then what is you perceptive a perceptive.

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Refers to a set of symbols which human beings used to select from all poetically observable of aspects of nature when I again when say nature it includes both natural and social phenomena when I say technology is the medium through which human beings including us as subjects interact with nature that there also we find some kind of relationship between human beings and nature the earlier literature suggests that a nature always controls human action but we that rise of enlighten critical thinking modernity rejoining capacity and industrial revolution we always witness that no nature does not control human action rather human action controls nature.

There we see a shift in the faculty of contain place and to a faculty of control human beings not only change nature.

But also change the social relationships implicit it to us marks argued that by acting up in nature human beings not only change nature but also nature but also change themselves as social electors then let us come to what constitute science okay, science.

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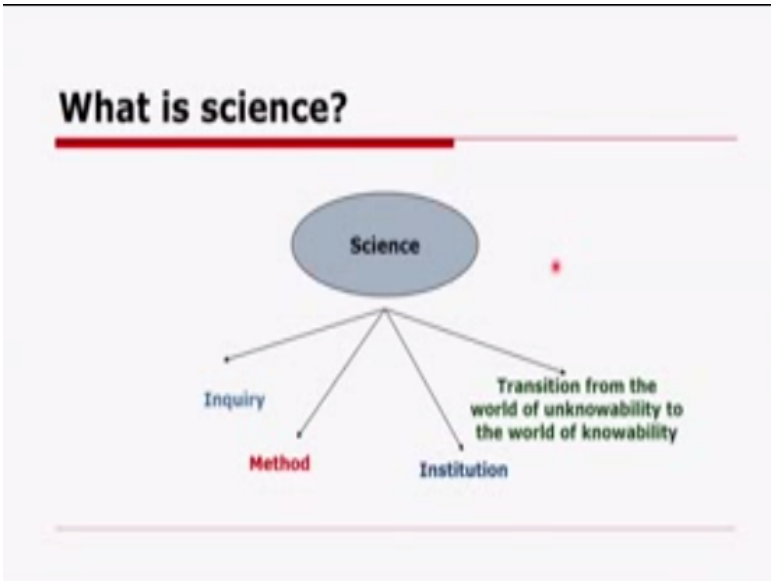

Can be dealing it through various modes science may be an in query science may be a method science may be an institution science may be an ideology science may be a transition from the world of a no ability to the world of no ability when I say science is an in query.

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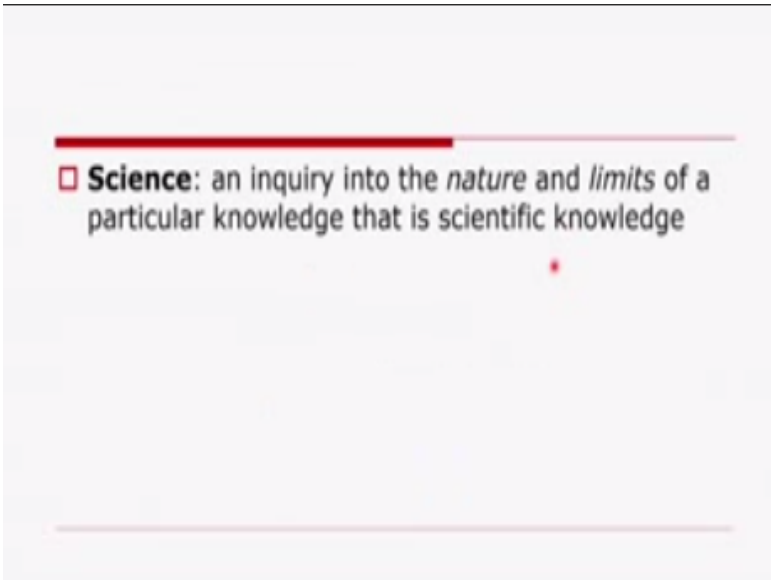

Into the nature and limits of a particular knowledge that is scientific knowledge when I say science is an in query into the nature of a particular knowledge by nature of a particular knowledge I mean the subject matter of knowledge, the scope and beat of that particular knowledge but when I say limits of a particular knowledge I do not mean limitations, but limits I mean under what limiting conditions science is practiced or persuade even a set theory has limits in mathematics in said what is the set theory is a branch of mathematical logic.

If you look at even a said theory if I say we mean I can say there may be many sub sets I can say American women I can say African women I can say Ancient women even a sub set called women can also defeat many other sub sets, then when I mean Indian women Chinese Women Japanese women Pakistan women and so. When I say women here I cause some limiting conditions not limitations in this context science is an in query into the nature and limits of a particular knowledge that is scientific knowledge.

Science is also a method where we have in what we encounter is that the objective of science and the objective of non science is the objective of science is to arrive at the truth the objective of say religion is also to arrive at the truth but they are different, the objective does not make a distinction between science and religion rather it is the method which distinguishes science from religion science does not mix speculation the way religion touch science believes in the empirical and do rest to methods of inquiry.

When I say empirical I mean it is based on experience when I say reasonless method I mean it is based on this will discuss these two methods of inquiry two methods of science in the lectures to follow when will be discussing methods of science okay, I mean it is the method that makes a distinguish between science and religion science does not believe in any kind of speculative philosophy rather science always starts with verifiable facts if I say I have seen a ghost it does not imply that a religious person may accept this.

But a person of science will never accept this precisely because it is the method that a nest distinguish between science and religion science always believes in observable and verifiable facts. After discussing science as an inquiry as well as science as method let us come to a point where we can say science as an institution, after discussing science as an inquiry as well as science as method let us come to a point where we can say science as an institution, science as a social institution.

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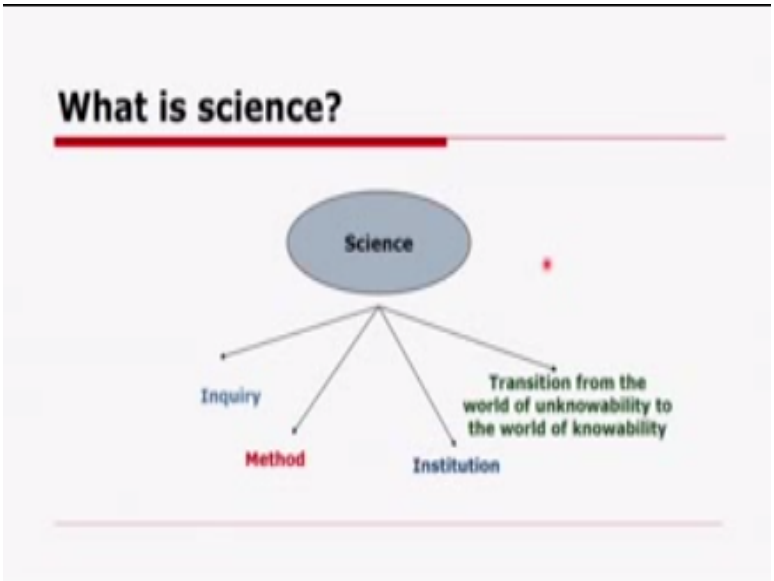

Science as a political institution okay, the way we witness science as a social institution, science as a political institution we also discuss this particular component of science as a social institution when we discuss Mertonian ethos of science Robert Mert okay, I mean what kind of norms science follows or truthful that is a prescriptive matter, there is a normative matter to science as an institution, science as a social institution as Merton enhanced that have to follow the principles of universal religion, comminution, dis-interestness and organized is kept decision.

When he says science as a social institution, science as a political institution also we can say but when we look at science as a political institution also we can look at the way magazines which propagated by Hitler during the Second World War okay, we will come to this point later on when we talk about science and technology having political properties. The way science can be a part of the state technology can be a part of the state both science and technology can be the absolute of the state by predicts of the state, then we can, we will discuss this things. Science also is an ideology we will back to magicians which I refer to science also becomes a part of ideology, science is treated as an ideology.

How you propagate your ideology is through propagating through science that is what Hitler did during his regime, during his horrendous regimes during the second world war in Germany, okay. Science also it is a transition from the world of know ability to the world of know ability science

teaches us how to move a transition from darkness to light, science also teaches us how to move from the world of unknowns to the world of knowns, science also teaches us how to create, how to go shine, how to interrogate the existing structures and sub-structures which other forms of inquiry may not be able to do.

Science only teaches us how to create a space to accommodate different perspectives, different opinions there is no linear thing about science this linearity has to contain even if it has such linearity within science has been questioned by philosopher of science, historians of science and sociologist of science.

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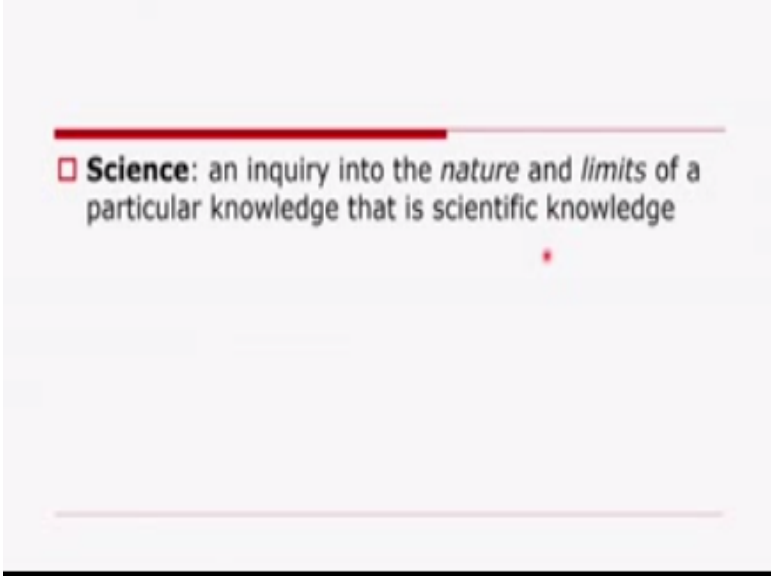

Let us see how till now what we have discussed we will see okay, what we have discussed till now.

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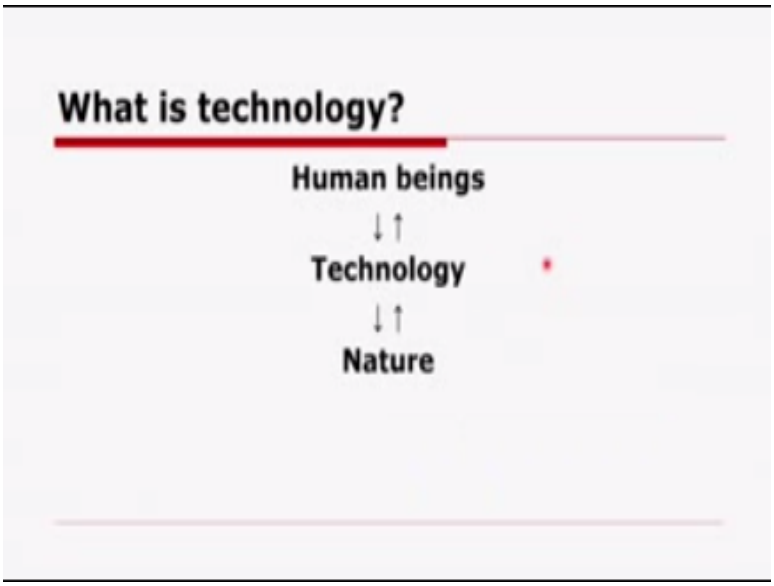

We have discussed how what is your technology, what is science and then we will see how they are inter-related okay, when we see the relationship of technology and science technology is very often known as the act of doing and science is known as the act of knowing, then this act of knowing and act of doing they must go hand in hand we cannot isolate the act of doing they must go hand in hand we cannot isolate the act of doing or act of knowing to or we cannot treat them in isolation there mutually influenced there co related okay.

Many people's very often say that science is basic where as technology is applied we must be able to question this, these inferences our inference is that technology predates modern science technology also can predates modern science in the sense let me give you an example this fast the steam engine was invented and then we en-counted the loge of thermodynamics.

I mean technology also change is the direction of basic research that is why an imminent theoretical physicist Abdus Salam from Pakistan one said today's basic science will be tomorrow's applied science and wise reverse even applied science also changes the direction of the principles of basic science's okay. In this context what we are trying to do? These themes that science technology and society as emanating from the congou medicine of three disciplines of

philosophy of science or history of science and sociology of science that one may have questions about philosophy of science history of science sociology of science.

What is philosophy of science? The question philosophy of science is as old as science itself the question the method of science, what is the method of science is as old as science itself in fact such questions where post by arrested long back. The way philosophy of science that we try to construe philosophy of science is an enquiry in to the nature and limits of a particular knowledge that is scientific historical history of science is an enquiry in to the nature and limits of a particular knowledge guided by history guided by the methods of history.

It may be archival research it may be historical research it may be library research and so on. And it may also be empirical histories which are guided by our experiences when we talk about sociology of science it is an enquiry in to the nature and limits of a particular knowledge guide be social and political institutions. There are very various examples of social institutions political institutions and so on if I say political institution it may refer to the state, when in say social institution may be in the form of family may be in the form of marriage may be in the form of kin seep and so on okay.

Social institutions the way we see the formation of IIT is the way we have seen the formation of CSIR labs the way we are seen the formation of universities they are also part of social institutions they are educational institutions they also form certain norms values and so on, there is a difference between norm and rule okay in social vague what we say rule if I say please keep to the left walk on the left hand side of the road I mean that is the rule which is legally bound.

When I say norm, norms evolve of an social acceptance there they may not be legally bound at times okay but rules are always legally bound in this sense we are talking about social institutions political institutions they have the norms values institutional frame works institutional mandates for example the institutional mandate of this state may be to provide welfare majors for the development of a society for it citizens.

But if you look at the value system the values that the state has it may go inside with the values that state edge it may go inside with the edges distinguished it may not go inside at times in this sensefruidge okay now what till now what we have discussed very quickly I will tell you that we have just discussed technology, science and the relationship between technology and science. We

have not discussed the relationship of technology and science with society will discuss it later on okay.

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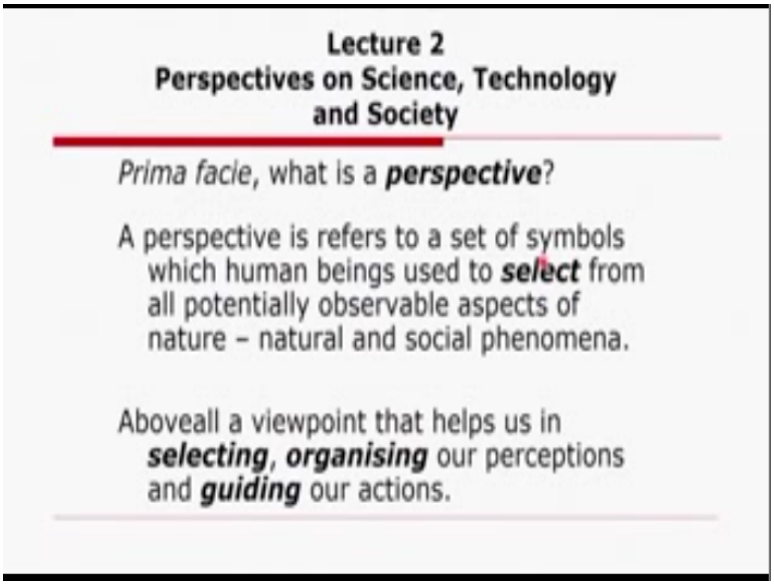

Now as we have already discussed what is the perspectives that the perspectives on science technology and society that the relationship now we are trying to built okay prima facie what is a perspective? A perspective refers to set of symbols which human beings used to select from all potentially observable aspects of nature when I say nature I repeat it includes both natural and social phenomena.

Whenever I speak about perspective there are three things which must be kept in mind one selection two organizational perspectives, and the way the thirdly the way this two components selects and organize in the perceptions they guide our actions that is why perspective is a view point that helps us in selecting organizing our perceptions and guiding our actions.

There is a difference between the perception and the perspective a perception is the immediate contact that individuals have which nature immediate contact again when I say nature it includes both natural and social phenomena those that immediate contact must be tested right or wrong those that immediate contacts.

That we have it may be tested wrong that is why I gave you the example of that have seen a ghost okay that is the immediate contact that we have with our immediate surrounding our

immediate environment but that may be tested wrong that is why it is there is a need to have a perspective that is why there is, there is an need to organize our perceptions to arrive at a perspective.

And there is to denote the any single perspective there must be multiple perspectives a single perspective will be undemocratic, a single perspective is ineligible to the formation of democratic society where as multiple perspective will lead us how to have a more human society more democratic society okay.

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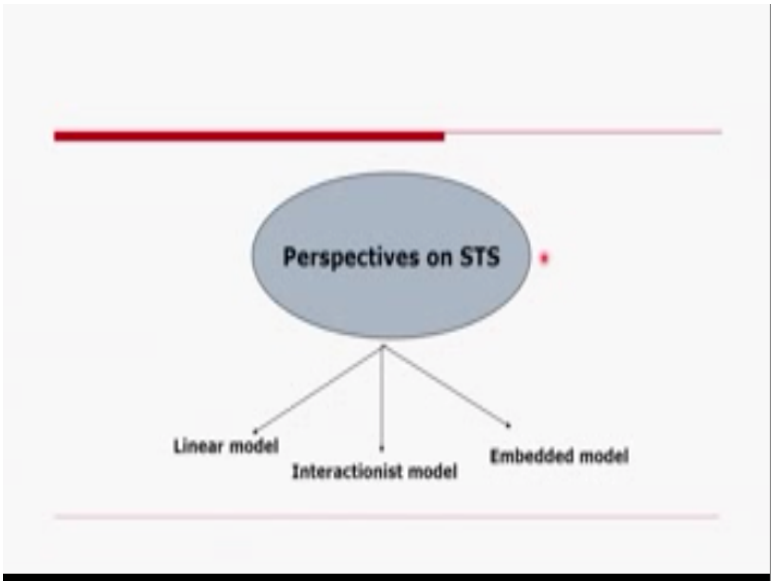

There are three models, there are three perspectives in general it does not implies that there not be other perspectives that may be multiple perspectives but overall in the scheme of STS science technology and society what we are trying to do we are trying to formulate their perspectives or three models one the linear model, two the interactionist model, three the embedded model.

Let us see what these three models of the relationship between science technology and society indicate let us go ay one by one the linear model suggests that science leads to the development of technology and technology leads to the development of society they followed an erroneous formula that know it always start with basic science, basic science leads to the application of those taht5 those basic sciences and which will have enormous impact on society on social funds okay if you look at the interactions model it suggests

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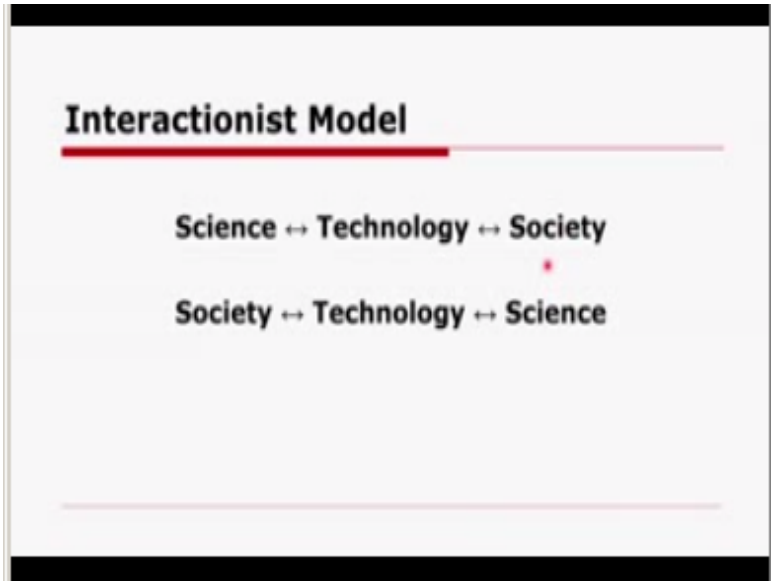

Science leads to the development of technology, it also leads to the development of society internal society also leads to the development of technology and science then what is the similarity between the linear model and the interactionlist the difference one can easily observe that in the linear or hierarchical model it is also known as hierarchical model of the relationship between science technology and society this linear model suggests that there is a one way relationship between science technology.

And society there is one way interaction between science technology and society where as the interactionist model suggests no there is two variations in between science technology and society a particular that's why we always say that no science and technology may not be considered universal then perhaps all country you will have similar kind of science and technology policies the kind of science policies that gives us Indian may not have that kind of policies the kind of science policies the earth while soviet union had India may not afford to have that kind of science.

And technologies it is a different question that can India have an independent science and technology policy that will discuss towards the end of this course okay but what is the similarity there the first one suggests the linear model suggests that there is one vary less ion the second one the interactionist model suggests no there is a two vary lessons no then what is the similarity the similarity between the linear model and the interactionist model of the relationship between

science technology and society is that both these model treat science technology and society as separate end to teach whereas the embedded model.

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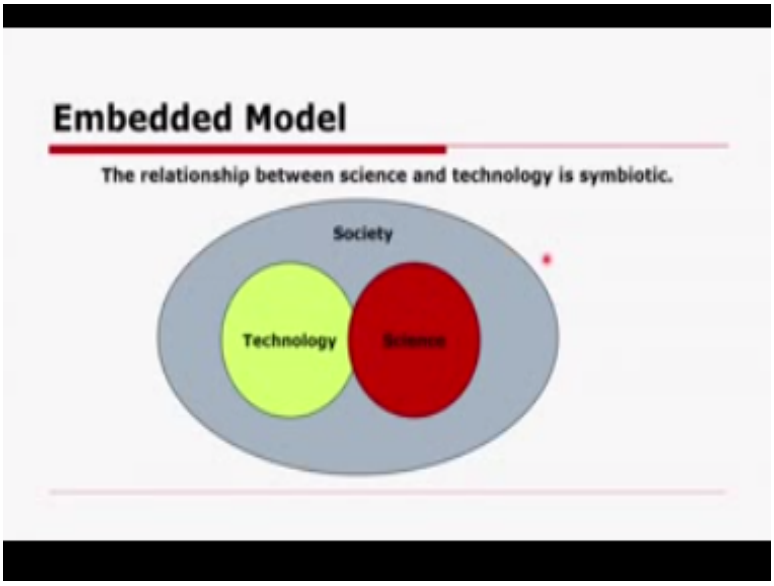

Suggests that know they are not separate entities rather the relationship between the science and technology is symbiotic the two forces of production namely science and technology they are very much a part of society okay if you look at the past two models linear and interactionist model.

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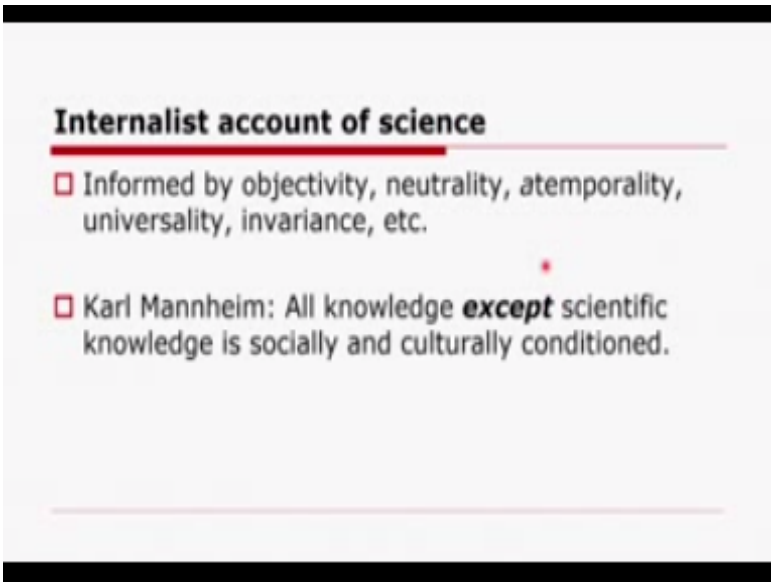

They exhibit the internalist account of science which is informed by objectivity, neutrality, a temporality, universality, invariance and so on but for this reason call mainline one of the founders of society of science and technology wrote in ideology in neutron that all knowledge except scientific knowledge is socially uncultured cannot be shift I must emphasize the way he must Maine suggested that All knowledge except scientific knowledge is socially and culturally cannot be shift and then science becomes.

Superior science is objective science does not take upon any kind of subject factors science is neutral science is at importable and in science does not vary across time and space science is universally conditioned science does not vary science is not variant okay as I can such internalist account of science guided by linear interanalist model the embedded model suggests that no this interanalist model does not hold.

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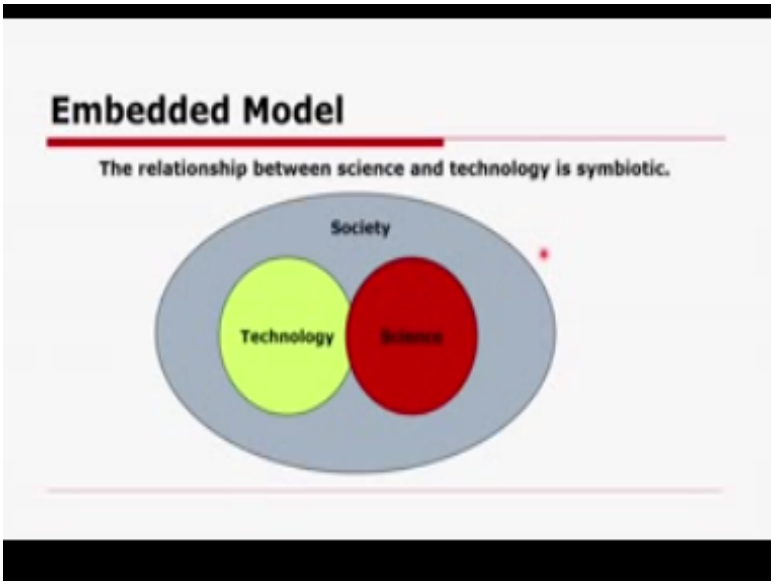

Two the embedded model suggest that science and technology are very much a part of society social permission.

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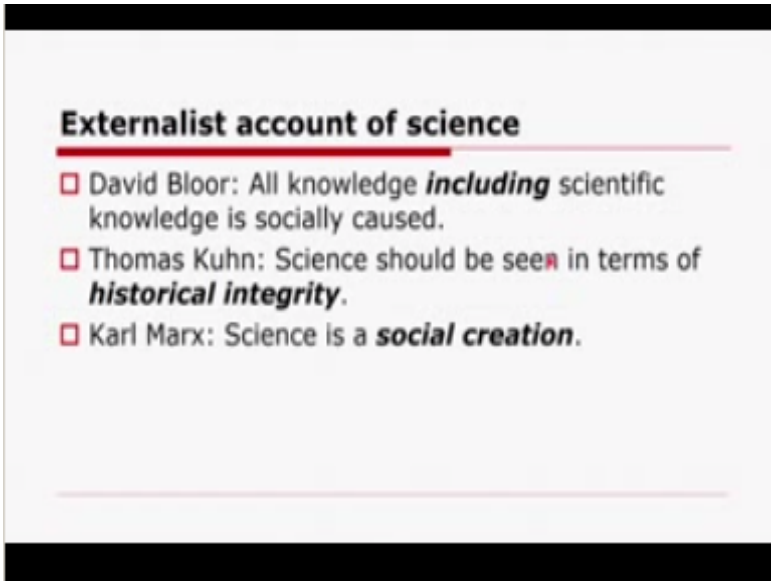

Such externalist account of science the way embedded model has given us the externalist account of science David Bloor said in knowledge in source imagery in 1976 that he opposed the statement of that all knowledge except scientific knowledge is socially and culturally conditioned rather Bloor said no knowledge including scientific knowledge is socially caused. Again Kuhn said in structure of scientific revolution of 1962 it is one of the best references in the world of HST studies, that science should be seen in terms of it is historical integrity.

Even before this once Mark said what is science? Science I social creation, science is not an abstract creation of some excellent, I mean it is always a byproduct of human action okay. Human action edited by social norms, social values, social institutions. Now what we have discussed till now?

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We have discussed, we started with what is technology? Then what is science? The relationship between technology and science, then we have discussed relationship technology and science with society and then we have discussed three modules, 3 perspectives which we have taken to discuss this relationship between technology and science society, namely the linear module, the module and the embedded module. Now we can also have other modules of in query.

I will say that this kind of debate which has given rise to this, whether we must go ahead with internals accounts of science or external accounts of science can be seen in many works. You can look at generals like social studies of science, science technology and even values which has always given us the impetus that this debate is still on. With specific reference to India, one also can look at many things. One can look at with specific reference to India, when I say; you can look at objectivity, subjectivity debate with specific reference to India.

I mean in the philosophy of science by Dell okay. We can give examples of the construction of the technologies, social construction of the technology okay. This internal region external region debate is still on what we want to do now? Is that how to mediate these two, can we just say that no we will go ahead with internal debate, internalistic account of science, can we just say we should go ahead only with the externalist account of science? No.

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