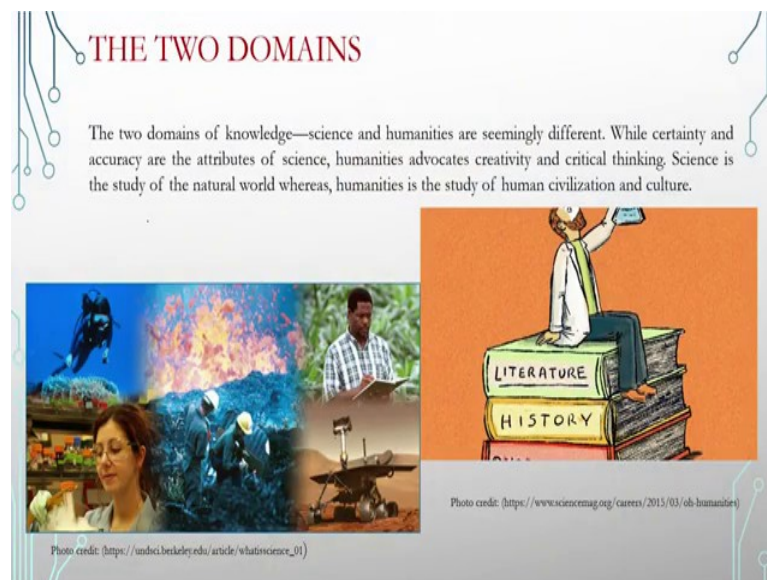


Artistic Exploration in Scientific Research And Technology
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Lecture - 01
Science and Humanities

Hello, in the first lecture we will see how science and humanities began to be seen as separate disciplines and why there has been a need to have a meaningful dialogue between the two. Let us start with the two domains.

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The two domains of knowledge science and humanities are seemingly different. While certainty and accuracy are the attributes of science, humanities advocates creativity and critical thinking. Science is the study of natural world whereas, humanities is the study of human civilization and culture.

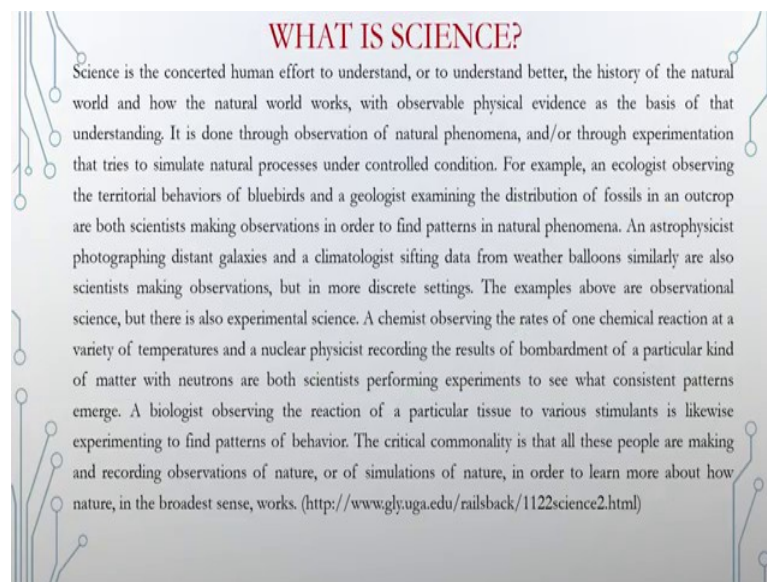
We know that there are various forms of truth and different criteria of evaluating and validating each form of truth. Besides scientific truth achieved through investigation and examination, there are logical and mathematical truth and truth established in writing of history and quote laws. There have been many philosophical approaches to deal with the forms of truth ranging from notions of the synthetic a priori to deep analysis of induction, deduction and mathematical proof.

However it is often seen that knowledge systems that developed around this modes of establishing the truth are mutually exclusive. Science is synonymous with modern or the non traditional, science is often synonymous with physics and physics with Newton's principia. Newton's principia represent fundamental knowledge about a knowable in the universe as a knowledge about the underlining principle or laws besides the national phenomena.

Fundamental knowledge is still a logical or encompassing unified enhance grand theoretical; thus science which originated in the west during the 17th century embodies, logo centric knowledge of authority, authenticity, openness, transparency, finality, certainty and universal credibility.

Humanities originated as the basis of broad education for citizens along with grammar rhetoric and logic arithmetic geometry and astronomy and music form the bulk of medical education. A major shift occurred in 15th century when humanities began to be regarded as a subject to study rather than practice. A corresponding shift occurred in the focus area from traditional subjects to areas such as history and literature.

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Now, let us see what is science. Science is concreted human effort to understand or to understand better the history of natural world and how the natural world works with observable physical evidence as a basis of that understanding. It is done through

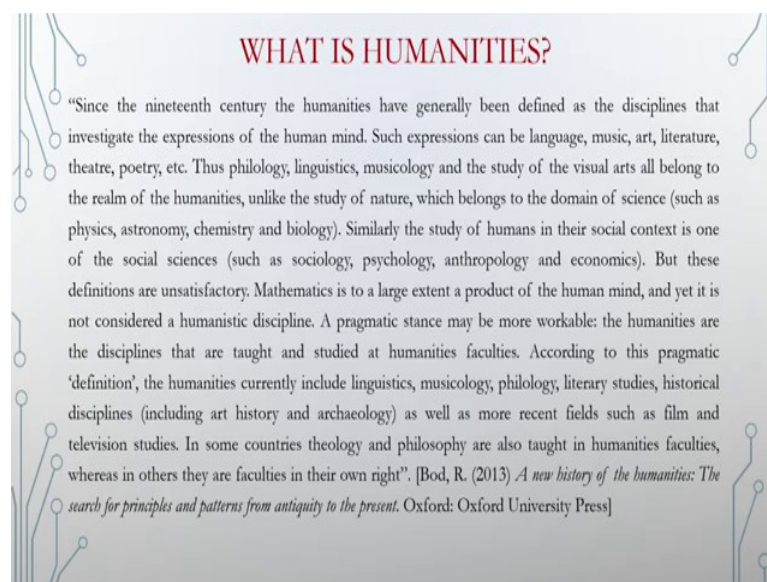
observation of natural phenomena or through experimentation that tries to stimulate natural processes under control conditions.

For example an ecologist observing territorial behaviour of bluebirds and geologist examining the distribution of fossils in outcrop are both scientists, making observations in order to find patterns in natural phenomena. Any astrophysicists, photographing distant galaxies and a climatologist sifting data from weather balloons similarly are also scientists making observations, but in more discreet setting.

The example above are observational science, but there are also experimental science. A chemist observing the rates of one chemical reaction at a variety of temperatures and a nuclear physicist recording the result of bombardment of a particle particular kind of matter with nutrients are both scientists performing experiments to see what consists patterns emerge.

A biologists observing the reaction of a particular tissue to various stimulants is like likewise experimenting to find patterns of behaviour. The critical commonality is that, all these people are making and recording observations of nature or of simulations of nature in order to learn more about how nature in the broadest sense works.

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So, we have seen what science entity entities. Now, let us see what humanity is consists of. Since the 19 century the humanities have generally been defined as the disciplines

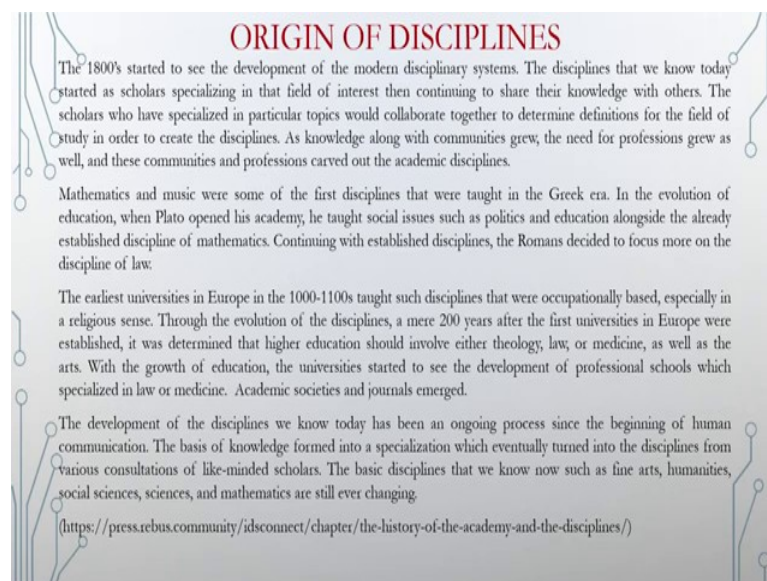
that investigate the expressions of the human mind; such expressions can be language, music, art, literature, theatre, poetry etcetera thus philology linguistics musicology and study of the visual art all belong to the realm of humanities unlike the study of nature which belongs to the domain of science such as physics, astronomy, chemistry and biology.

Similarly, the study of human in the social context is one of the social sciences such as sociology, psychology, anthropology and economics, but this definitions are unsatisfactory. Mathematics is to a large extent a product of human mind and yet it is not considered a humanistic discipline.

A pragmatic stance maybe more workable therefore, the humanities are the disciplines that are taught and studied in at humanities faculties. According to this pragmatic definition the humanities currently include linguistics, musicology, philology, literature studies, historical disciplines including art history and archaeology as well as more recent fields such as film and television studies. In some countries theology and philosophy are also taught in humanities faculty where in whereas, in others they are faculties in their own right.

So, what are we trying to do in this course? We are actually trying to push disciplinary boundaries.

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ORIGIN OF DISCIPLINES

The 1800's started to see the development of the modern disciplinary systems. The disciplines that we know today started as scholars specializing in that field of interest then continuing to share their knowledge with others. The scholars who have specialized in particular topics would collaborate together to determine definitions for the field of study in order to create the disciplines. As knowledge along with communities grew, the need for professions grew as well, and these communities and professions carved out the academic disciplines.

Mathematics and music were some of the first disciplines that were taught in the Greek era. In the evolution of education, when Plato opened his academy, he taught social issues such as politics and education alongside the already established discipline of mathematics. Continuing with established disciplines, the Romans decided to focus more on the discipline of law.

The earliest universities in Europe in the 1000-1100s taught such disciplines that were occupationally based, especially in a religious sense. Through the evolution of the disciplines, a mere 200 years after the first universities in Europe were established, it was determined that higher education should involve either theology, law, or medicine, as well as the arts. With the growth of education, the universities started to see the development of professional schools which specialized in law or medicine. Academic societies and journals emerged.

The development of the disciplines we know today has been an ongoing process since the beginning of human communication. The basis of knowledge formed into a specialization which eventually turned into the disciplines from various consultations of like-minded scholars. The basic disciplines that we know now such as fine arts, humanities, social sciences, sciences, and mathematics are still ever changing.

(<https://press.rebus.community/idsconnect/chapter/the-history-of-the-academy-and-the-disciplines/>)

Let us see how science and humanities began to be regarded as separate disciplines let us see how the disciplines as we know today emerged in history. In 1800s the 1800s started to see the development of the modern disciplinary system.

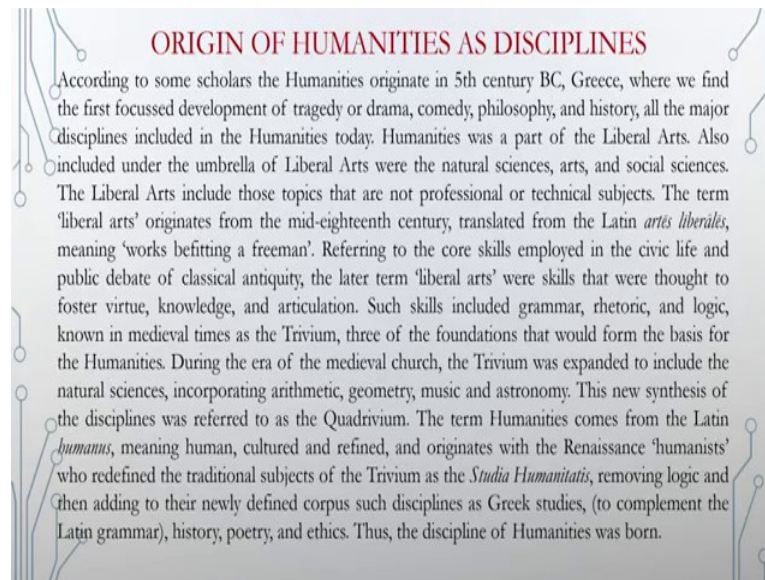
So, before the 1800 there was no nothing like a discipline the disciplines that we know today started as scholars specializing in the field of interest then continuing to share the knowledge with others. The scholars who have specialized in particular topic would collaborate together to determine definitions for the field of study in order to create the disciplines. As knowledge along with communities grew, the need for professions grew as well and this communities and [professor/professions]- professions carved out the academic disciplines.

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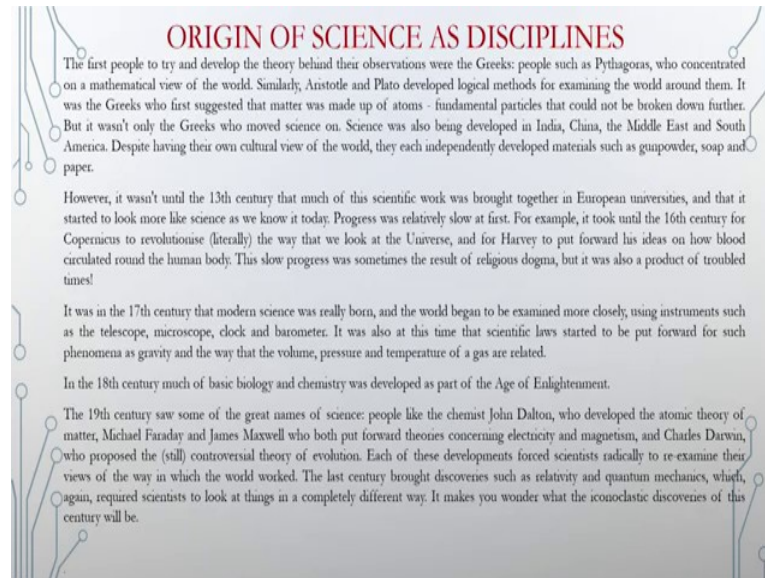
Now, let us see how humanities emerged at the as the discipline. As we see that earlier it was a set of practices, but it as an academic discipline how it emerged. According to some scholars the humanities originated in 5th century BC Greece, where we find the first focus development of tragedy or drama comedy philosophy and history all the major disciplines included in the humanities today. Humanities was part of the liberal arts also included under the umbrella of liberal arts where natural science arts and social sciences.

The liberal arts include those topics that are not professional or technical subjects. The term liberal arts originated from the mid 18th century translated from the Latin arts liberales, meaning works befitting a freeman. Referring to the core skills employed in the civic life and public debate of classical antiquity, the later term liberal arts were skills that were taught to foster virtue knowledge and articulation. Such skills included drama, rhetoric and logic known in medieval times as the Trivium three of the foundation that would form the basis of the humanities.

During the era of medieval church, to Trivium was expanded to include natural science incorporating arithmetic geometry music and astronomy. This new synthesis of the disciplines was referred to as the Quadrivium the term humanities comes from the Latin humanus meaning human cultured and refined and originates with the renaissance humanist who redefined the traditional subjects of Trivium as the Studia Humanities removing logic and then adding to their newly defined corpus such disciplines as Greek

studies to compliment the Latin grammar history poetry and ethics thus the discipline of humanities was born.

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Further let us see how the discipline of science was born. The first people to try and develop the theory behind their observations were the Greeks people such as Pythagoras who concentrated on a mathematical view of the world similarly Aristotle and Plato developed logical and methods for examining the world around them. It was the Greeks who first suggested that matter was made up of atoms fundamental particles that could not be broken down further, but it was not only the Greeks who moved science on. Science was also being developed in India China the Middle East and South America. Despite having their own cultural views of the world they each independently developed materials such as gunpowder soap and paper.

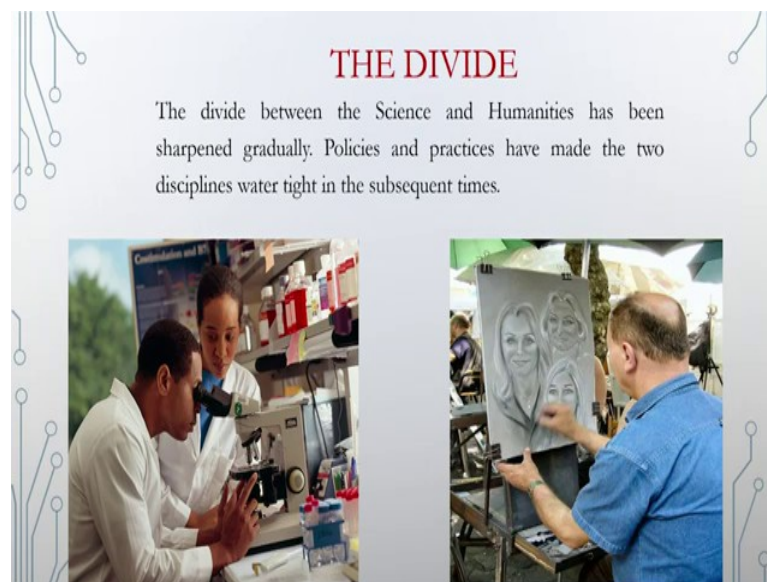
However it was not until the 13th century that much of the scientific work was brought together in European university, and that is started to look more like science as we know it today. Progress was relatively slow at first for example, it took until the 16th century for Copernicus to revolutionize the way we look at the universe and for Harvey to put forward his ideas on how blood circulated around the human body. This slow progress was sometimes the result of religions religious dogma, but it was also a product of troubled times.

It was in the 17th century that modern science was really born and the world began to be examined more closely using instruments such as the telescope, microscope, clock and barometer. It is also this time the scientific laws started to be put forward for such phenomena as gravity and the way that the volume pressure and temperature of gas are related.

In the 18th century much of the basic biology and chemistry was developed as part of age of enlightenment. The 19th century saw some of the great names of science, people like the chemists John Dalton who developed the atomic theory of matter, Michael Faraday and James Maxwell were both put forward theories concerning electricity and magnetism and Charles Darwin who proposed the controversial theory of evolution.

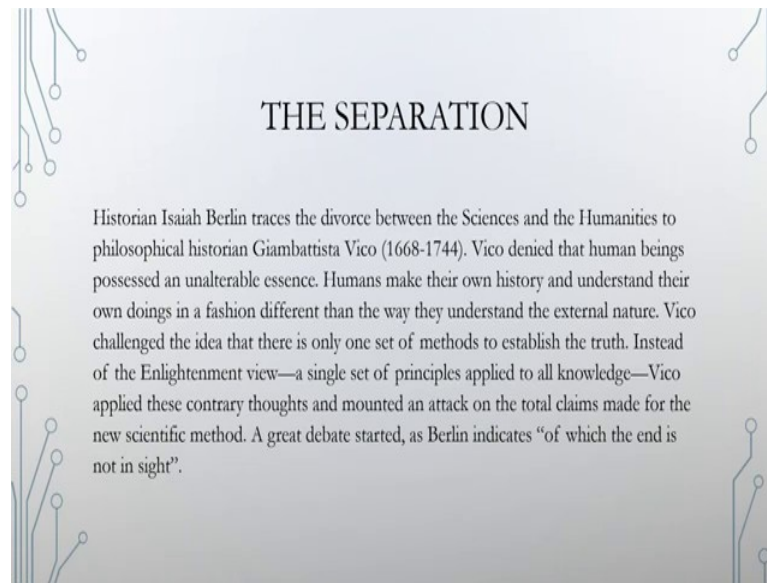
Each of these developments forced scientists radically to re-examine their views on the way in which the world worked. The last century brought discoveries such as relativity and quantum mechanics, which again required scientists to look at things in a completely different way. It makes you wonder what the iconoclastic discoveries of the century will be.

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The divide; the divide between the science and humanities has been sharpened gradually, policies and practices have been made the two disciplines watertight and in the subsequent times. The worldview that natural and human science are mutually exclusive has led to more crisis than one.

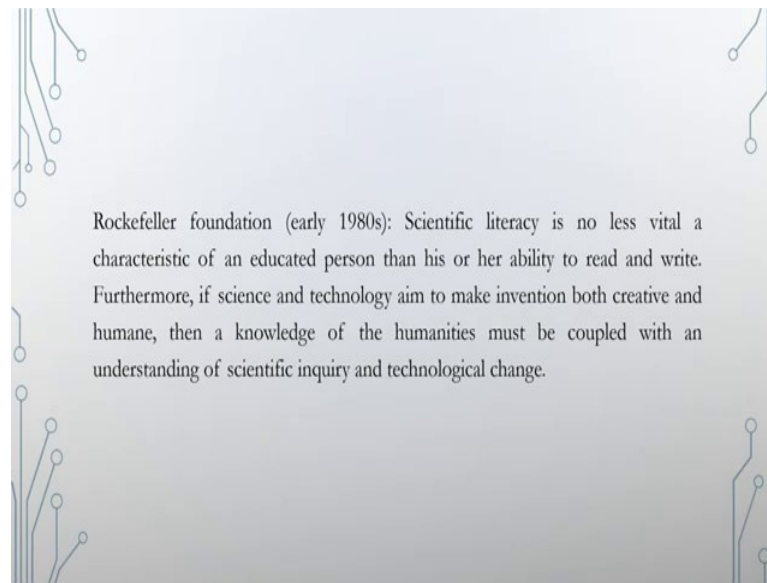
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The separation; historian Isaiah Berlin traces the divorce between the sciences and humanities to philosophical historian Giambattista Vico. Vico denied that human beings possessed an unalterable essence; humans make their own history and understand their own doings in fashion different than the way they understand the external nature. Vico challenged the idea that there is only one set of methods to establish the truth instead of the enlightenment view a single set of principles apply to all knowledge. Vico applied these contrary thoughts and mounted an attack on the total claims made for the new scientific method.

A great debate started as Berlin indicates of which the end is not insight has this led to any crisis.

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Of course, it has. The world view that natural and human science are mutually exclusive has led to more crisis than one over the years policies have been made to fragment educational enterprises into cubicles, overlooking that new knowledge and new insights have often originated in the boundaries of disciplines.

We have tended to imprison disciplinary studies in opaque walls; this has restricted flights of imagination and limited creativity. This character of education has restrained and restricted individual right from the primary education and continues till the higher education level. This is particularly vile in the university level because one of the requirements of a good university should be engaged should be to engage in knowledge creations, not just for the learner, but also for a society as a whole.

Globalization in the 21st century has been seen to be have brought about a dynamic change in the society, the present society is often referred to as techno capitalist society. What appears to be surprising is the ineffectiveness of the system of education and preparing the youth competent enough to be serving the current techno capitalist world system and its knowledge economy.

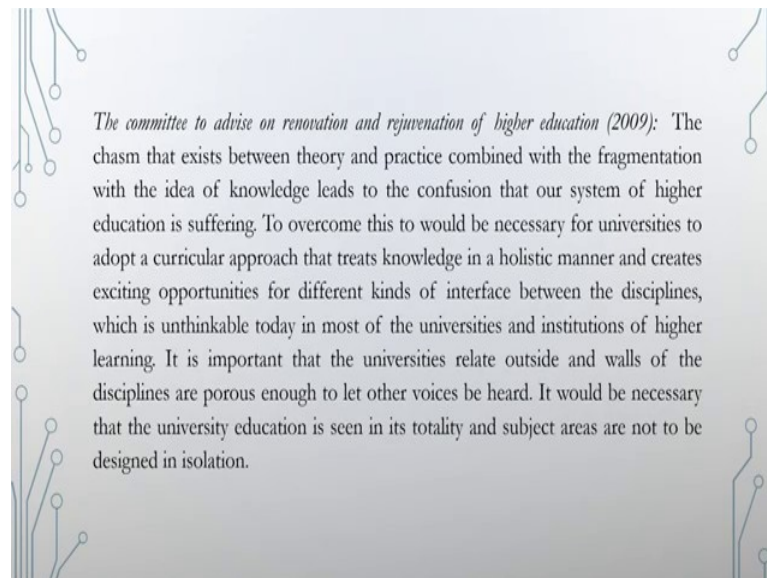
The world today harps on technology and science which is wanting new forms of corporate power and organizations. Corporations have erected a system of intellectual property rights to confiscate creativity with profound impact on the economic science and culture. With the growing global importance of intangibles like new knowledge and

technological innovativeness, the inequalities between nations at the front of line of techno capitalism and those there are not are widening.

The complexities of the problem we face in a rapidly globalizing world, demand solution which are firm holistic, the interrelated nature of the growing challenges requires knowledge and methodologies which straddle several disciplines and draw out meaningful responses.

It was a Rockefeller foundation in the early 1980s that pointed out the scientific literature literacy is no less vital a characteristics of an educated person than his or her ability to read and write. Furthermore if science and technology aim to make inventions more creative and human then a knowledge of the humanities must be coupled with an understanding of scientific inquiry and technological change.

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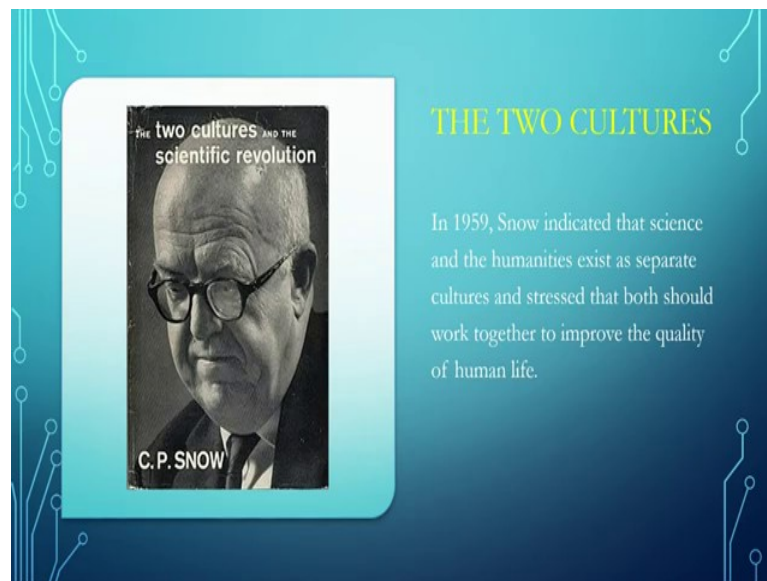


Our own in India the committee which is most popularly known as the Yashpal committee report suggested that, the committee was formally called the committee to advise on rejuvenation of higher education which was published in 2009, the committee recommended that the chasm that exists between theory and practice combined with the fragmentation with the idea of knowledge leads to the confusion that our systems of higher education is suffering. To overcome this to it would be necessary for universities to adopt a curriculum approach that treats knowledge in a holistic manner and create

exciting opportunities for different kinds of interface between the disciplines, which is unthinkable today in most of the universities and institutions of higher learning.

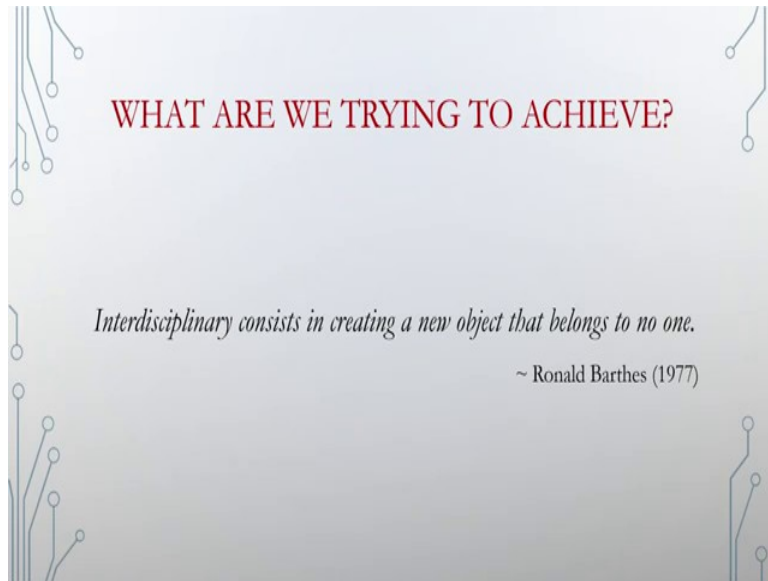
It is important that the universities relate outside and walls of the disciplines are porous enough to let other voices be heard. It would be necessary that the university education is seen in its totality and subject areas are not to be designed in isolation.

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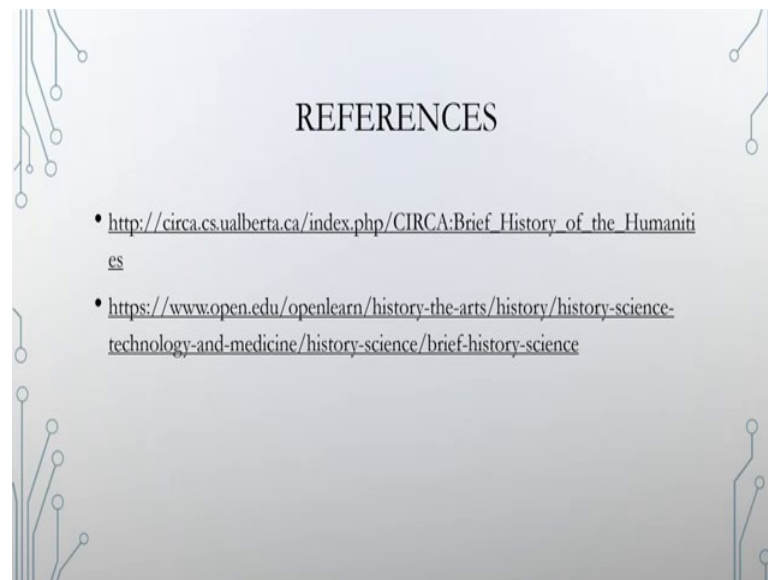
This divide of course, was at first very popularly pointed out by CP Snow, who in his 1959 lecture said that science and humanities exists a separate cultures and stressed that both should work together to improve the quality of human life.

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So, what are we trying to achieve in this course? We are trying to achieve interdisciplinary approach through this course interdisciplinary consist in creating a new object that belongs to no one.

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These are some of the reference you can look up. So, friends from the next class onwards we will see how folk art and science can come together to have a meaningful dialogue and new frontiers new knowledge is can be created in the frontiers of disciplinary boundaries.

Thank you, see you next time.