Outcome based Pedagogic Principles for Effective Teaching
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Lecture 02
Accreditation

Okay, so in first lecture I read some questions that challenges in twenty first century education. One of the mutual challenges I have said that how to improve the student engagement. Many teachers are complaining that the students are now at the students are not engage kind of thing. So how do improve the student engagement.

So during the course if you if find that you are defining a teaching leaning process by which we can say that yes teaching learning if I followed this kind of teaching learning process but pedagogy the teacher has student engagement might be improved.

So before I go to the details of that lets begin with that accreditation that if you say today people are talking about that NBA accreditation, Washington accord accreditation because that has an angle to improve the quality of education or you can say the effective teaching. So, what is accreditation is also an important issues today.

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Now before I come to the accreditation that can we measure that quality of education or I can say can we measure the teaching quality? That means suppose a institute A offering a program lets

B. Can I measure or I can say whether I will attend the program B or not, can I judge based on some parameters? If you say that if I want to buy anything from the market lets if you want buy a television what is look for?

You look for the data set of the television. Okay, some parameter that means to look for some parameters by which we judge the quality of the product. So the parameter is define by the manufacturer and based on which we quantify or we can say we judge the quality of the product. Same kind of things that I offer a program can we say that can you write down something in such an some parameter based on which we can say this program is better than this program or this programs not better also if we say this program is suitable for me and this program is suitable for else.

Today if you see before a let us the engineering education, when a student join in any program he or she does not know what kind of skill you will develop during this program. What I am saying is that let us suppose I have admitted in a program call four year program or BE civil. Let us the program name before I join BE civil I don't know what kind of skill set or what kind of minimum skill set is required to declared myself as a BE civil engineer.

You may say that okay I will get a certificate for BE civil engineering but certificate does not carry all because certificates I have certificate but if I do not have specific skill or if I do not acquire that skill then people will say what is the difference between you and me because you you are civil engineer what do you don't does not have any skill.

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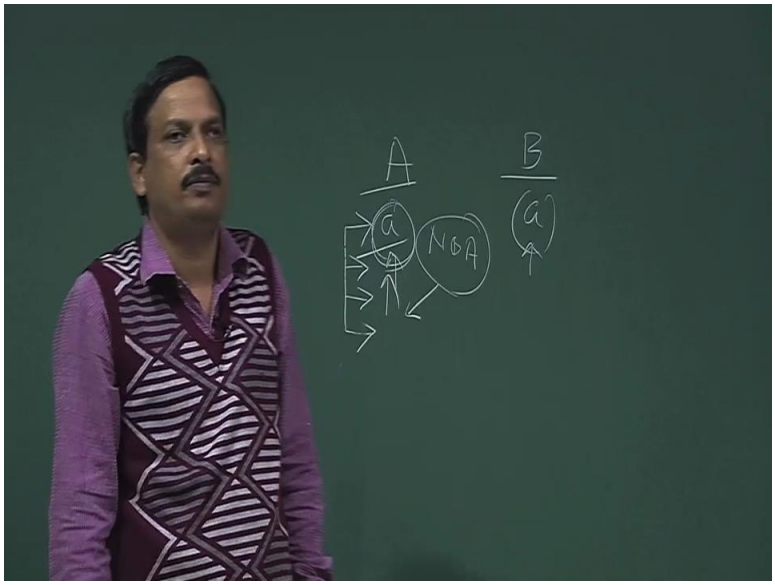

So, accreditation is a process that… Why it is require first of all that suppose I I am I follow a program A and another possible is follow a program B or I said program A and also lets the institute A and institute B same program a and program a here also for program A. how can I said the program a of institute A or program a of institute B is the same or they are different only by this.

So I said that I want to find out whether this program or I can I want to measure the quality of this program a based on certain parameter that is called attribute. So if you see there is lot of boards is coming out. If you see the Washington accords, NBA all are accreditation board.

So accreditation board what they are looking for? They are looking for that can I say those of the minimum attribute, those of the attribute to measure the program and though the if if if I in institute A cell this is my program is NBA accredited that means NBA is a organization which will guaranteed that this program maintained the minimum quality or based on the certain parameter which is required that said this program is maintain the minimum quality.

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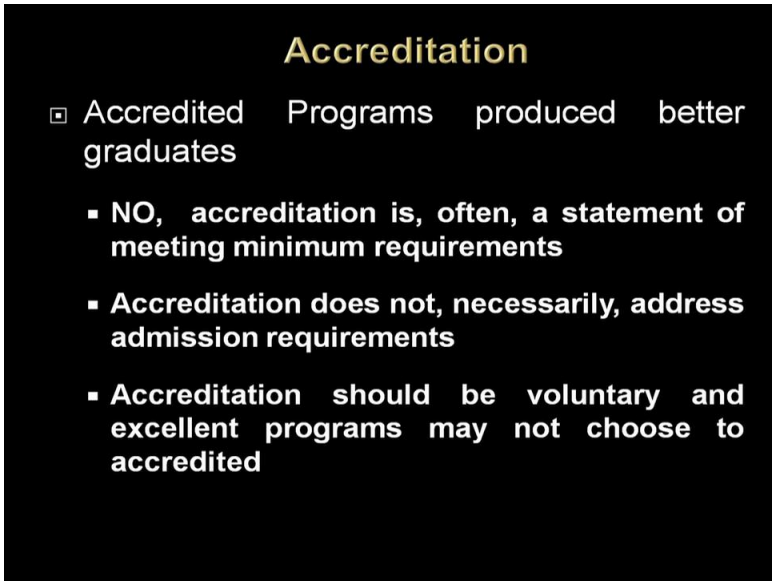

So if I say accreditation program produce better graduate. So definitely no, accreditation accreditation does not guaranteed the producing graduate are better. Accreditation guaranteed that the program meet the minimum criteria or I can say that this program follow a teaching leaning process and curricula which maintain the minimum criteria required or default required to build for for this kind of program.

So four year B.Tech program lets say the fourth year B.Tech in civil so NBA only look for whether your curriculum and teaching learning process produce the graduate which meet the minimum criteria required for BE civil engineer of four year kind of program okay. So those are called as accreditation.

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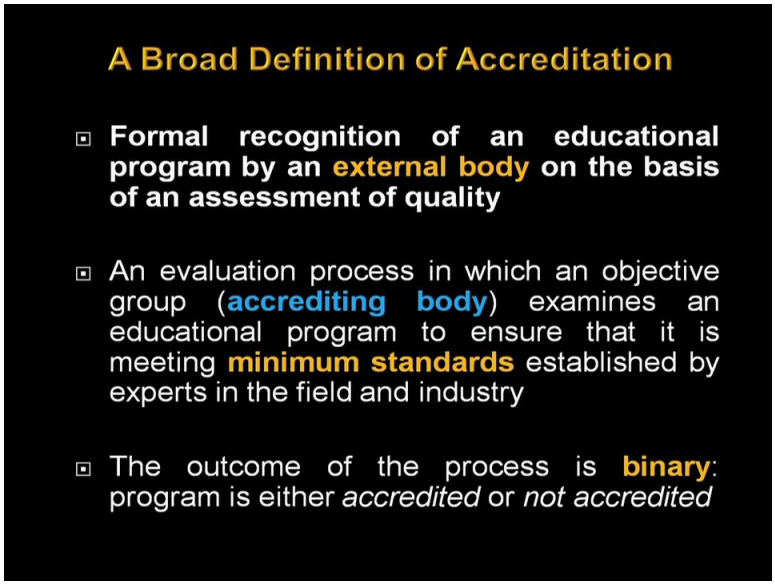

So accreditation that is several body for accreditation several process, so accreditation were the help for the value of accreditation.

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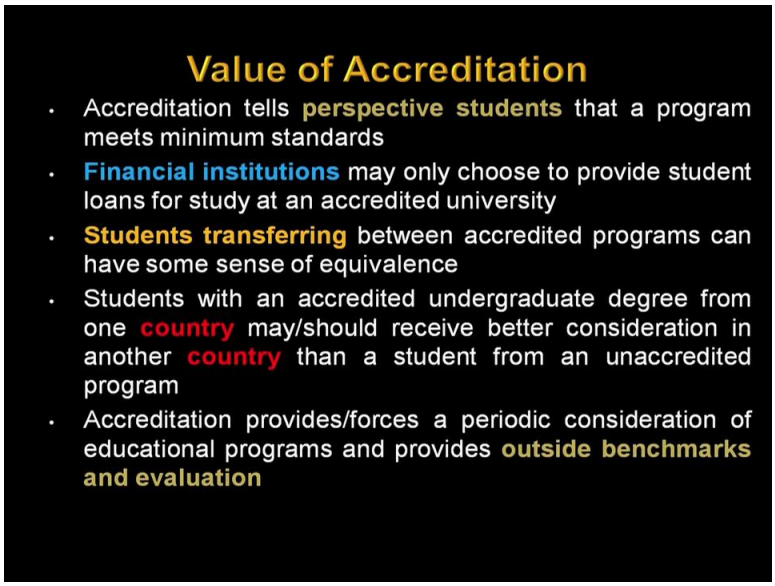

Accreditation tells perspective student that a program meets the minimum standard. So before a student come to the program he know, he or she knows this program meet the minimum criteria required for declaring a BE or graduate engineer or same all of things M.Tech engineer. So that

is the accreditation. So financial institute say those of the accreditation program they are guaranteed the minimum quality so we support them.

Similarly student transfer one of the major issue today if you see it is best on the reputation of the institute. IIT graduates so it can be transferred to all or if I say that IIT today IIT also allowing. Suppose I want do a course in some other foreign institute and the credit can be transferred.

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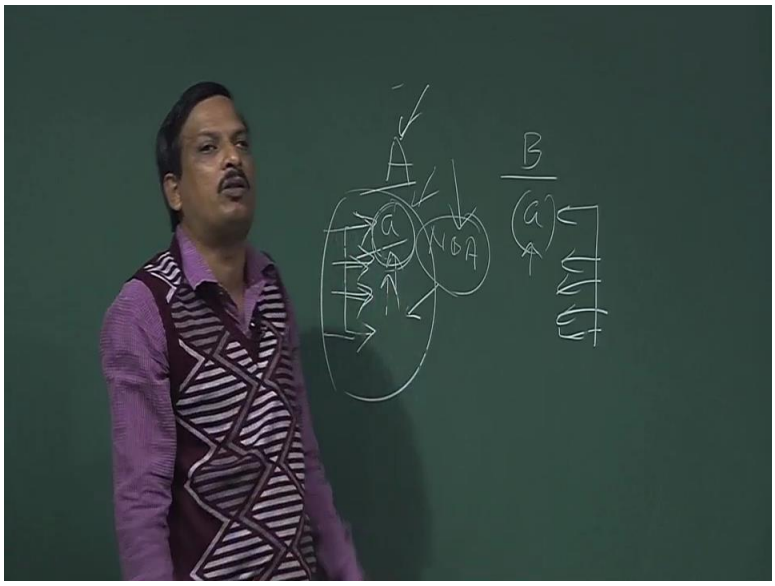

So this is base on the you can say the brand name of the institute but can I say that yes you will able to transfer the credit because the program a maintain the quality parameter this and program a of institute B also maintain the same quality of the program respect to certain parameter. So, you can transfer, so there is no mismatch.

Or think about like that that a country A produce a graduate engineer whether the country B will accept the they are the graduate engineer or not that depends on the skill set. So accredation, accreditation is same that those of the minimum parameters those of the minimum quality or skill set is required by the student if the student said that I am graduate from this program.

So accreditation program accreditation model only see the whether the program follows that structured or not but whether the learner acquired that knowledge or not is not there, so then you

have evaluate you have to follow a evaluation system it is validate yes, all the learner acquire them okay.

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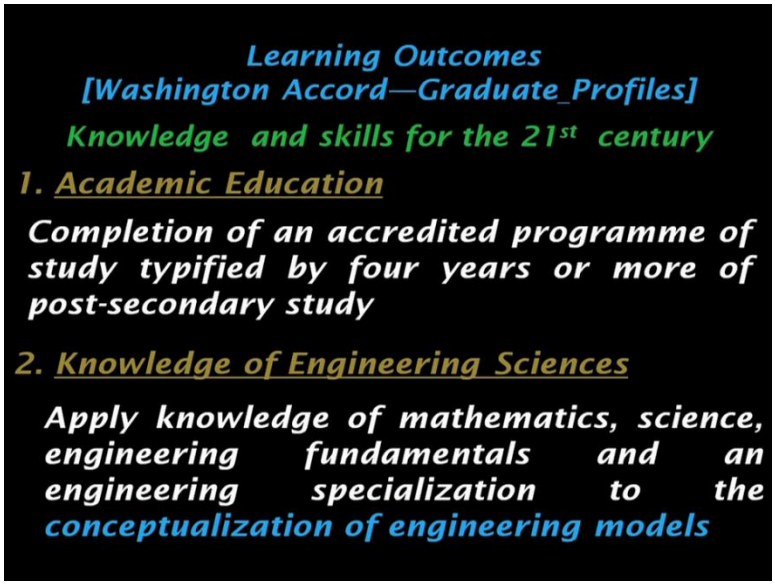

Now but what accreditation means? Let us start with Washington accord. Washington accord said it is for the four year graduate program, four year program, it says the student should able to apply knowledge of mathematics, science, engineering fundamental and engineering specialization to conceptualization engineering model.

So one of the parameter is that if I say my program is follow the Washington accord so my graduate engineer must be able to apply knowledge of mathematics, science and engineering fundamental to conceptualize the engineering model.

That means they have capable to use their mathematical, science and engineering fundamental knowledge to conceptualize engineering model. It is not that my engineer is graduated with a ninety percent marks. So this talk about skill, this is one of the skill. What is the next skill?

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Design solution for complex engineering problem and design system component or a process that meet specified needs with appropriate consideration for public health, safety, cultural, societal and environmental consideration.

So these attribute says the attribute see says that design aspects of the graduate engineer. If I say my engineers are follows the Washington accord requirement they should able to design solution for complex engineering problem. I cannot say they only know what is thermodynamics, what is the definition of entropy, not like that. It is said they should able to design solution, they should not able to, let say electronic engineer say I do not know sir how to do design the push pull amplifier. I only know a describe the push pull amplifier.

Describe is an important but describe is in lower cognitive behavior that is not required for the BE, BE engineer should know more that means this would able to design solution for a complex engineering problem and or systems or a part of the component or a poor process that meet the specified need with appropriate now domain the multi (())(12:52) section.

Appropriate consideration of public health, safety, cultural, societal and environmental consideration they not only know the how to design this but also they have to know how the public health cultural and societal aspect can be incorporate during the design of complex engineering.

Next one is that forth forth parameter investigation, conduct investigation for complex problem including design of a experiments, analysis and interpretation of data and synthesis of information to provide valid conclusion. If I say my graduate electronic graduate engineer does not to know how to latch a signal. They only do the experiment. They go the lab, do not touch any machine, they only take the read data and they see that to previous year report and produce a lab report and submit to you.

That does not meet that requirement of the Washington accord. Washington accord says that a graduate engineer must able to conduct investigation for complex problem including design of experiment. So they should know how to design the experiment, analyze and interpretation of data.

If the data is collected, if the just a copied from the previous year or previous year students and make a lab report if you find many of the institutes has the lab report which may be created in in the beginning of that engineering era and still it is continue that kind of knowledge you do not require.

They should able to analysis the data or analyze the data and after analysis they should able to valid interpretation. What kind of interpretation is coming from the analysis then synthesis of information to provide valid conclusion. After analysis they should able to about synthesize also and provide a valid conclusion.

So if I say the today my engineer only know how to how to operate how to measure that dc volt between the two terminal so there is lab exp (experiment) lab setup is already made there, now they go there and taking a multimeter and touch the two lead and take a reading that is not needed.

They should able to design a experiment, they should able to collect the data, they should able to analyze the data, they should able to make a valid conclusion from the data. So requirement for graduate engineer is not that simple. Similarly if I say fifth modern tools and usage, fifth parameter is modern tools and usage.

You may say my graduate engineer so let that graduate engineer of the civil have should know how draw a engineering drawing using CAT, CAM software then should I call them call him or she a civil engineer.

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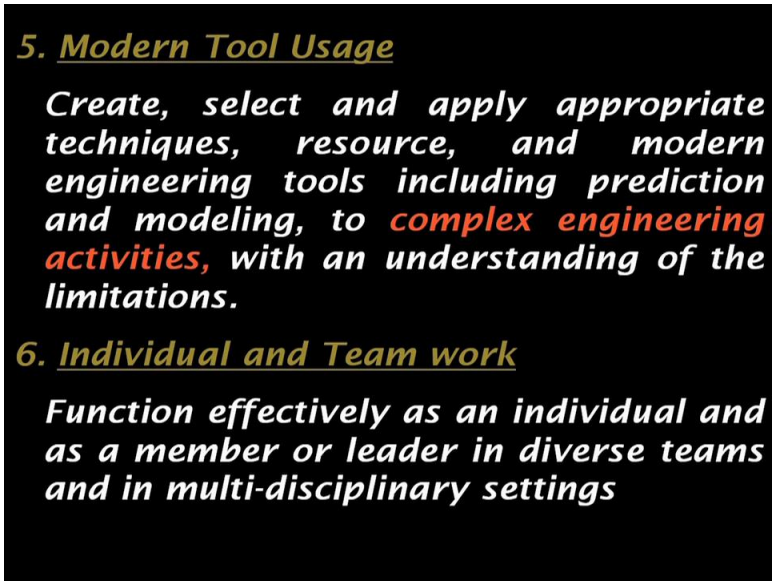

So, this creates select and apply appropriate technique, resources and modern engineering tools including prediction, modeling, to complex engineering activity with an understanding of the limitation.

That means a engineer should know the modern tools also. How to use the modern tool to simulate something and also know what is the limitation of this tool? What he cannot do within this tool. So not only the use of the modern tools but also the you can say the limitation of that tool which which kind of problem he cannot solve using this tool.

So engineering tools modern tools usage is also one of the major parameter for the engineering education. So I can I cannot say is civil engineer does not know how to draw how to use CAD, CAM software for the drawing cannot say that, it is required. So modern tools and usages is an important parameters for measuring whether this program is Washington accord accredited or not.

If my program has to be Washington accredited then if if it is electronics then all the modern tools which is available in the electronics field. The student must know each of the tool and their limitation.

Next one up to 5 up to here 1,2,3,4 and 5 are the domain dependent parameter. Civil engineer is different from electronics engineer, different form electrical engineer, different from mechanical engineer, different from chemical engineer. There is certain attribute which is domain independent like that individual and team work that means it is a domain independent attribute they should also learn.

The function effectively as an individual and as a member or leader in diverse team and in multi-disciplinary setting. A graduate engineer must know how to work in a team, how to lead a team, how to work the diverse people because that is the need in the industry.

While the employee in the industry, he has to deal with the diversities his team mate may be somebody come from that electronic engineer background, somebody is require from the chemical engineer background so he has to work in diverse field. He has to lead the team. He has to be active member of the team.

So this kind of individual and team work that skill also is one of the parameter for measuring the program. So by offering a course I can say okay students will able to design something, they should able to conduct experiment. Remember there is also there is a domain independent parameter, individual team work also adjust.

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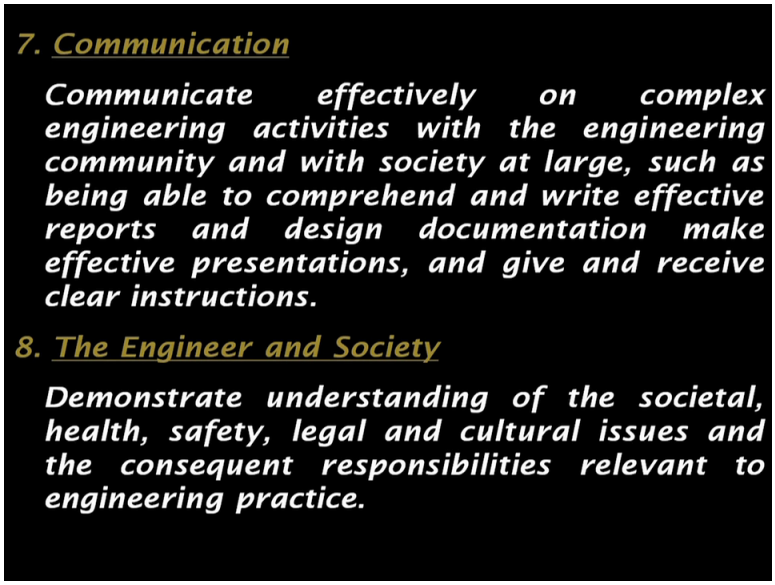

Another domain independent parameter communication, communicate effectively on complex engineering activity with the engineering community and with the society at large, such as being able to comprehend and write effective report, design document, make effective presentation, give and receive clear instruction.

It is not said that every engineer must talk as American English, every every engineer must talk as British English. It is not that require. It is requirement is that they should able to communicate his fellow colleague with effectively. He should able to write a technical report, he should able to give clear instruction to his subordinate. So this communication skill also has to be developed among the engineers.

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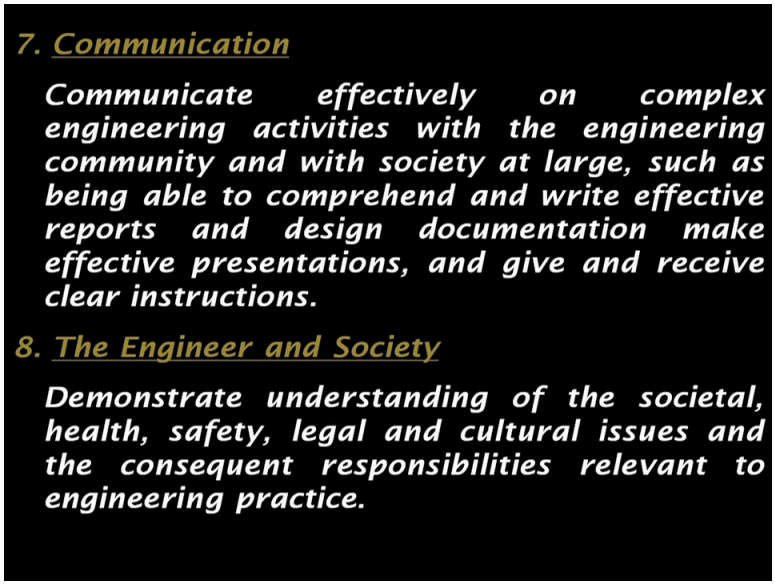

So if I say I have a graduate engineer so my domain dependent attributes are one to five those I have meet but I have not meet the domain independent activity. Then this program is not Washington attribute accreditation. So while I will meeting the domain dependent attribute I also meet the domain independent attribute. I will come how do you do that.

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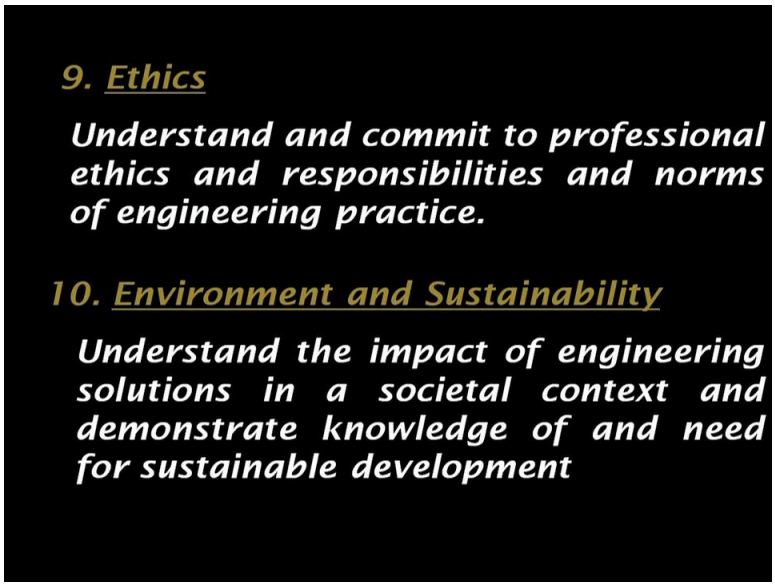

Then engineering in society demonstrates understanding of the societal, health, safety, legal and cultural issues and the consequent responsibility relevant to the engineering practices. There is

one of the parameter so by course or by teaching learning process that has to be developed. Next ethics understand and commit to professional ethics and responsibility and norms of engineering practice. We should understand and commit to professional.

I am not saying he is he is only develop the theory, he only know what is constitution of India no no not like that he has to develop a ethics. Understand and commit to professionally. Ethics has to be practices also. So I can how can I say that yes ethics is one of the important parameters for measuring the quality of engineer. So how do I teach the student so that their engineering ethics is build up, that is challenging.

Next one the requirement is environmental sustainability. Understand the impact of engineering solution in societal context and demonstrate knowledge of and need for sustainable development. If I say is engineer must know environment and sustainability parameter also.

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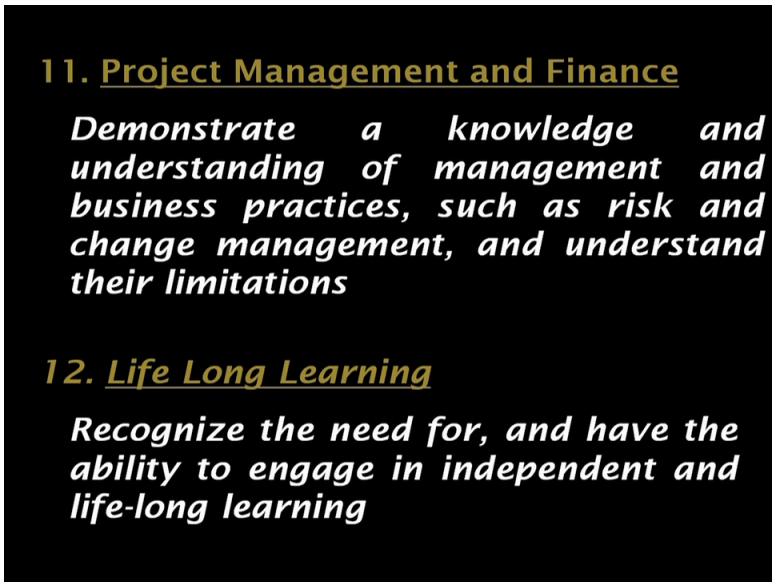

Next one project management and finance demonstrate knowledge and understand of management and business practices, such as risk and change management and understand their limitation. So as a graduate engineer not only know the domain dependent knowledge but also he has to demonstrate the domain independent knowledge also.

Last parameter is lifelong leaning which is very important and essential parameters for today. I have to equip my students for that their self-leaning ability is enhanced. If I spoon feed the

student many practices the students will come in the class, I give a lectures from one corner to another corner, they have note down that lectures, solve some problem in the blackboard in the examination system I give the same problem, they solve it and get the marks.

Am I improving their self-leaning ability? Am I am I improving any one of the skill which is mention in Washington accords, no. So spoon feeding the students is not improve the self-leaning ability. So I have to think how do I improve the self leaning ability of the student? What kinds of teaching learning process I should follow, so that their self-learning ability is improved.

So if you say that one to twelve, one to twelve all the graduate attributes which is required for accreditation. Some of them are domain dependent they can be developed by offering a domain dependent flow. Some of them are domain independent they also can be develop by preferring some course.

But if you see some parameters are there who cannot develop by offering the course. That means not only the curriculum, curriculum by curriculum I cannot say I meet all the twelve attribute, by curriculum I can say out of twelve eight may be meet but another four I can meet by the teaching leaning process.

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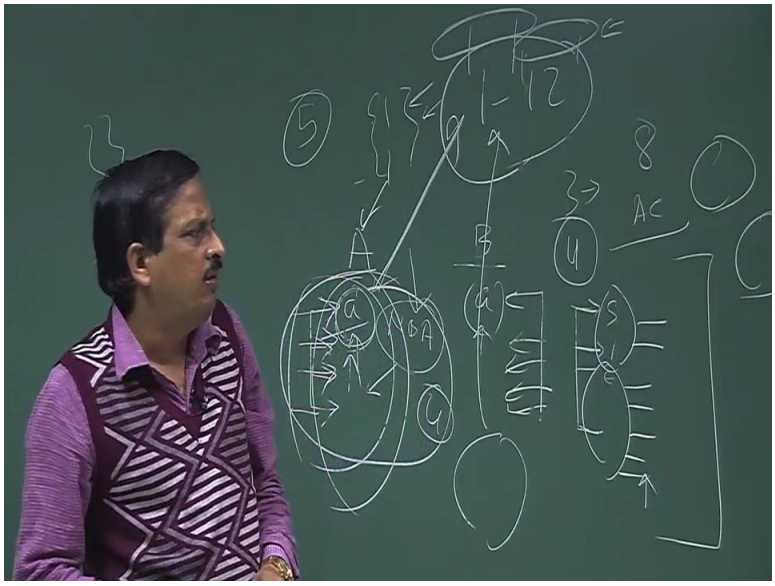

Here the effective teaching is come so Washington accord attributes, if I say that my program follow the Washington accord attributes then I have to design a curriculum which meet this

requirement as well as I have to design a teaching learning process which also scatter to this requirement.

So major challenge will come why will I am teaching the domain dependent subject lets I say that I taught AC machine. Design of AC machine or any subject called thermodynamics then I have to think while I teaching thermodynamics, how can I teach the lifelong learning, how can I build the ethics of engineering, so all not only the domain dependent attributes I have to scatter. I have to scattered to domain independent attributes also.

So today teaching leaning process demand that while I have teaching not only covers the domain dependent part but also cover the domain independent part. Now think about todays practices, suppose I talk a subject lets called thermodynamics and I prepare a power point presentation and come in the class and show the slide a want to slide ten and giving a one hour lecture without asking any question to the student.

I give one hour lecture, just deliver the one hour lecture. It is two problems, one is that the student will come to my class because if the if I take the attendance so to give their attendance because have some limitation in the administration background. They will come to my class. If it is large classroom most of the student will be do Facebook sitting in the back bench, most of the students will switch off their mind because they have know whatever the information teacher is delivering from slide number one to slide number sixteen all are available in the internet.

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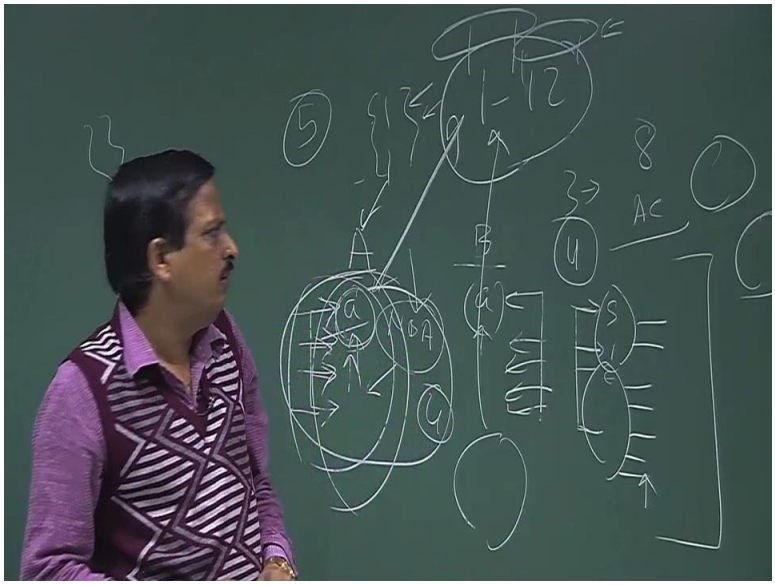

Earlier education system those information cannot available that's why I have to present in the class they get class note, but today whatever the lecture I will all information is available in the internet, then I have to think what I am doing? Should my lecture, my course cut at to any this twelve attributes are there any one of the domain independent attributes or which of the domain dependent attribute, so I have think that teaching what kind of teaching learning process I should use?

For that I am scattered to domain dependent attributes to the domain independent attributes and improve the student engagement that is called effective measure. So curriculum, how should I prepare my curriculum so that it cover that the minimum requirement of the graduate attributes.

See suppose I taught a design of AC machine and none of the my lecture is deal about the designing aspect of the machine that means none of the student is able to design a simple AC machine for a given specification. Then I am not covering the graduate attribute which is required as per the Washington accord.

So that means what kind of teaching learning process, what kind of curriculum structured should I follow so that I meet the graduate attributes required.

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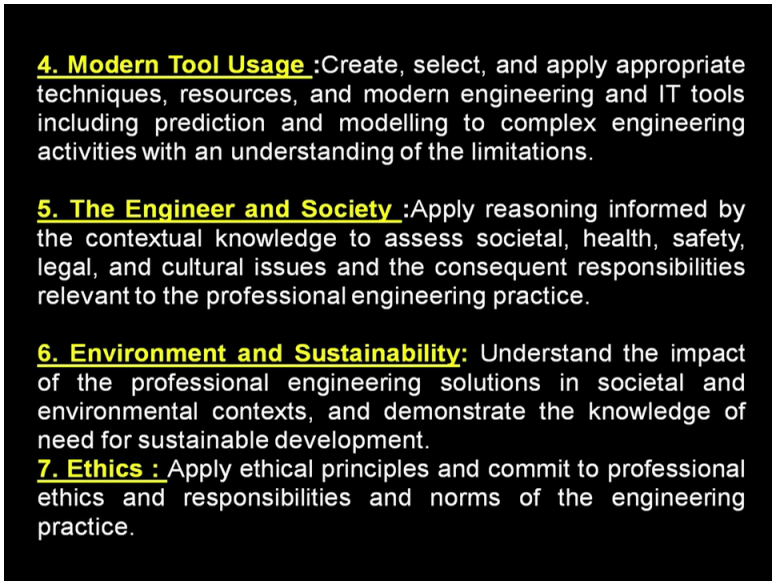

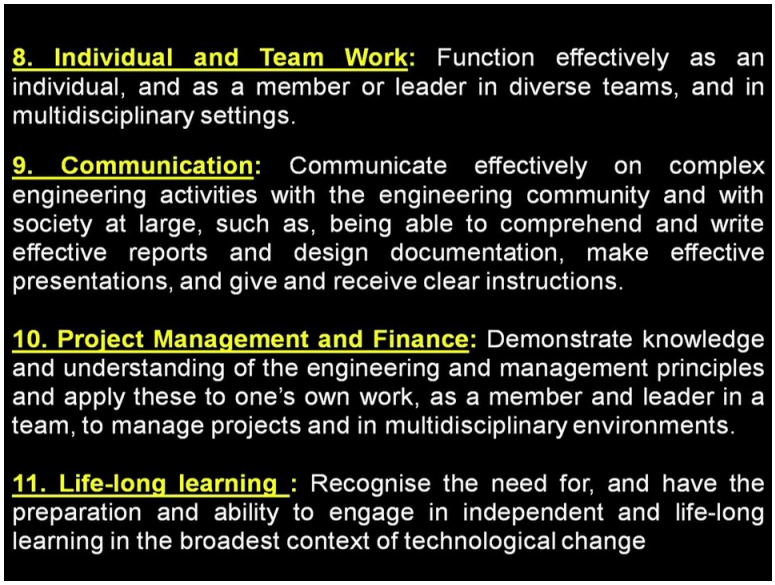

Now if you see NBA same same attributes of their engineering knowledge, problem analysis conduct investigation, modern tools and usage, engineering and society, environment sustainability, ethics, individual and teamwork, communication, project management, lifelong learning.

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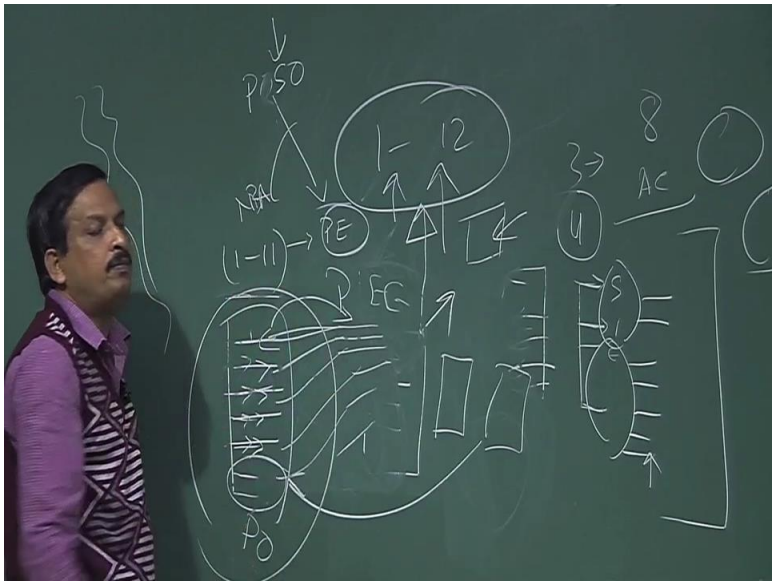

So some of our domain dependent rule, some of our domain independent rule but I have to ensure that my curriculum and the teaching learning process meet this NBA accreditation, NBA requirement. So I can say the any accreditation boards only specify certain parameter. By which I can measured the minimum quality of that program.

Those parameter are defined by the accreditation board, but while I am designing the program, let's program for electronics. I have to say those of the open ended parameters so if I say those of the one to eleven in case of NBA one to eleven of the parameter NBA, one to eleventh of the domain some are domain dependent parameter, some are domain independent parameter I have kept in here.

Now once I design my program that program outcome, outcome of the program must match with this must fulfill this requirement so all the program outcome which I will write must meet the each and every attributes.

I cannot say that this attribute I cannot meet then my program is not attribute so by structure of the curriculum and teaching-learning process much meet each and every attributes which is define by the accreditation board. So once I said this all eleven attributes for a electronics engineering graduate then I can say my program outcome to specific to the electronics. So I can say program specific outcome PSO and this is the program outcome.

So program outcome is defining by the accredited body. Those of the parameter you have to maintained if you are say your program is accredited and those parameter is specialized based on the your specialization or domain then I can say program specific objective.

So none of the electronic modern tools and usage is a program outcome, so electronics engineer only know the electronics field modern tools and their usage. Civil engineer only know the civil modern tools and by tools modern tool used in civil engineering and their limitation. So those are the different between this queue and queue program (())(32:54) okay.

So accreditation program (())(33:00) better graduate. It is only said that my curriculum and my teaching-learning process maintain the minimum criteria required for a graduate engineer which is defined by the accreditation board okay. So many institutes in India mostly the NBA accreditation is important where many colleges, many institutes are applying for NBA accreditation.

So NBA accreditation NBA says some parameters those parameter must be fulfill by your curriculum, designing of the curriculum and teaching-learning process, okay. So this is the accreditation so next lecture I will show what is outcome base education and how it is important for this kind of accreditation and also that how it is important for effective teaching which meet the twenty first century education challenges okay.